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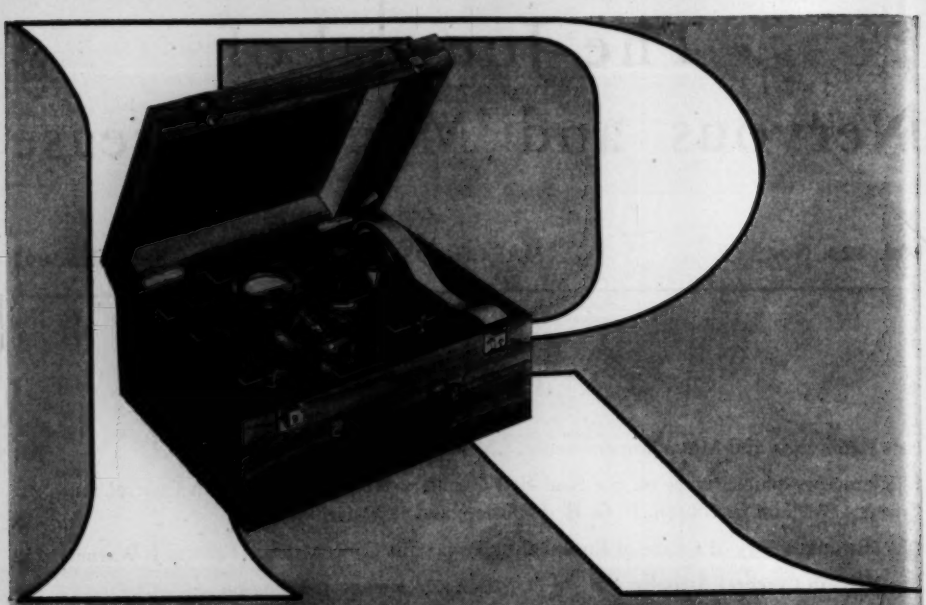

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LEFT HEMIPLEGIA AND MOTOR IMPERSISTENCE[1]

MILLER FISHER[2]

Introduction

Many clinicians in the past have remarked upon the occurrence of motor abnormalities of the eyes, tongue, face, and respiratory apparatus in disease of the cerebral hemispheres. Often these motor disorders were in the form of a more or less obvious dyspraxia, associated with dysphasia and a lesion of the dominant hemisphere. As was pointed out by Hughlings Jackson (2) as early as 1878, for example, many aphasics cannot protrude the tongue on command, direct the eyes as they are told, or take a deep breath. Also, in acute cerebral vascular insult, restriction of conjugate lateral gaze towards the hemiplegic side and at times deviation of the eyes away from the hemiplegic side are common clinical observations.

During the routine examination of patients rendered hemiplegic as the result of vascular disease, it was noted that the voluntary movements of these same parts were frequently abnormal in several further respects, and a description of these disturbances is the purpose of the present communication. The first abnormality which attracted attention was inability of the patient to *maintain* the eyelids closed or the tongue protruded although as a rule, the motor acts themselves could be briefly performed without obvious difficulty. As more patients were examined, other abnormal signs were often found to be associated. These included:

1) Gaze disturbances, consisting of: (a) inability to maintain conjugate gaze steadily in any direction when asked to look at an object or the examiner's finger. This might be termed "ocular vacillation"; (b) restriction of conjugate lateral gaze to the side of the hemiplegia; or (c) persistent conjugate deviation of the eyes to the side of the lesion.

2) Inability to maintain the mouth open, this usually occurring in association with difficulty in keeping the tongue protruded.

3) Inability to keep the eyes fixed centrally, on the examiner's nose, during testing of the visual fields, the patient's gaze being "attracted" uncontrollably to the stimulating finger on one or other side. This is akin to the ophthalmologist's "attraction response", and that designation is retained here.

4) An increased difficulty in holding the eyelids shut during sensory testing with the result that patients who could otherwise maintain closure of the lids for as long as 10 seconds often failed to do so for more than a second or two. In addition, in many cases there was an uncontrollable tendency to look towards the part of the body undergoing examination, the patient having been asked to close the eyes and turn the head the other way. This inquisitive performance was referred to as "peeking" or "cheating" by some patients.

5) Difficulty in taking a deep breath, holding the breath, or making a prolonged "ah" sound.

6) Difficulty in exerting a steady pressure during hand-gripping was found in some cases, the patient tending instead to squeeze briefly and intermittently.

These signs most often occurred transiently after a stroke, but occasionally they persisted for weeks, months, or years. For the most part the observations reported herein were made in cases of cerebral infarction due

[1] This work was supported by the United States Public Health Service, Grant B-731.

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to thrombosis or embolism, and, as a rule, marked motor and sensory deficits were also present. Although the patient was usually alert and able to converse, mental impairment of some degree was always present. Most striking has been the finding that the abnormalities enumerated above have been encountered *almost* exclusively in association with left hemiplegia in right-handed patients although the opposite side of the body had, in several instances, been involved in a previous stroke sometime in the past. It would appear that the neurological syndrome under discussion develops as the result of damage to the "non-dominant" hemisphere.

Whether the various signs have any special theoretical significance has not yet been determined, and therefore the data will for the most part be presented not as proving any specific thesis, but merely as clinical observations with the hope that they may be of interest and perhaps contribute to the unravelling of the problem of cerebral function. The grouping of the several manifestations under one syndrome presupposes an interrelationship which may not be substantiated by future observations, and of this I am quite mindful. An alternative would have been to present the signs as having little or no relationship to one another yet all of them representing evidence of damage to the non-dominant cerebral hemisphere.

Case Material

Ten case histories are presented, the first few being more complete than the others. Many of the details relating to the general physical examination and to the sensory examination have been omitted for purposes of abbreviation.

Case 1: A. T. (#708612), woman, aged 60. The patient, a mild diabetic with moderate hypertension, also had auricular fibrillation due to rheumatic heart disease. Five years previously she had had a sudden stroke with severe dysphasia and paralysis of the right side, virtually complete recovery occurring in two and a half weeks. She was then followed in the Out-Patient Clinic. A few hours before the present admission she was suddenly stricken with a total left hemiplegia due to cerebral embolism. Recovery began within 5 hours.

When seen 9 hours after the onset the patient could hold the left arm above the head and flex the fingers of the left hand with moderate power. The left leg could be lifted against mild resistance. There was a definite left lower facial weakness, and the eyes were deviated conjugately to the right. The patient was wide-awake, understood well what was said to her, and her own speech was correctly formed. She was oriented as to time and place, but did not appreciate the fact that her left side was weak, and she did not understand why she was in the hospital. She had been incontinent of urine, but attributed the soiling to someone's having spilled pineapple juice. She did not disregard her left side, at least totally; for on being told to extend her arms, she held up the right and then asked if she should hold up both. When the answer "yes" was given, she extended the left also. She recognized her hands as her own. Superficially she appeared to be in good possession of her faculties, but later she did not remember the first examination. Her personality was difficult to assess, one gaining the impression of mild hostility, suspicion, coldness, automaticity, superficiality, the patient never smiling, yet cooperating well. Touch, pin prick, and position were severely impaired in the left hand, and objects placed in the hand were not appreciated.

Special findings relating to present study. The patient was quite unable to close her eyelids on command, even after repeated urging. She said she understood the request but could not perform the act. Yet she blinked spontaneously, as well as to threat and bright light, in what appeared to be normal fashion, and though the eyelids closed reflexly on approaching them with the fingers in a threatening gesture, she could not maintain the closure for more than two seconds or so. She could wink with the right eye but not with the left, but was not sure if she had ever been able to perform the latter. There was no tendency to screw the lids shut on examining the fundi. The pupils were equal and reacted to light. The corneal reflexes were brisk. As already mentioned the eyes tended to deviate to the right at rest. Nonetheless full conjugate gaze to the left was still possible although it clearly required more effort, and the left lateral position could not be sustained. A left homonymous hemianopia was present. Upward gaze was restricted. On gaze forward, fixation of the eyes could not be maintained steadily, a constant shifting around the correct position taking place. Any movement in the right field of vision seemed to attract the patient's gaze, and in simultaneously testing both visual fields she could not prevent the eyes from looking to the right. Also when told to turn her head away and not watch what was being placed in her hand (identification of objects), she invariably turned her head and eyes to see what was going on. She seemed to comprehend the instructions well, yet she could not overcome this contrary tendency.

Furthermore, she could not open the mouth and maintain it open. On command she protruded the tongue well but could not hold it out for more than three seconds before it would dart back in. On request she could stick it out again, but once more it soon went back in. Speaking, swallowing, and chewing were not impaired. She was unable to maintain a prolonged expiratory "ah" sound, could not hold her breath, and on being asked to take a deep breath she invariably

made a forceful but not well-coordinated expiratory effort. She could cough satisfactorily.

There was no dysphasia, and several tests for apraxia (saluting, using scissors, clapping, combing, etc.) were quickly carried out with the right hand and with the left when weakness did not interfere with the required movement. Grasping and sucking reflexes were not obtained. "Gegenhalten" or inability to relax the left arm was noted only on one occasion. There was no failure to maintain the left arm and hand in any desired position, and indeed after holding the arms outstretched she brought down only the right unaware that the left was still extended.

Course. The patient was allowed up in a day or so, and was able to walk quite well though slowly. Power in the left face and hand gradually improved, but sensory loss was persistent.

Two days later the tongue could be held out, but the patient was still unable to close the eyelids, and gaze to the left was impaired. Anosognosia was still present. Four days from the onset the eyelids could be shut briefly, but they could not be maintained closed for more than a few seconds. The tongue could now be protruded fairly well, but with more unsteadiness or shifting about than normal. An electroencephalogram made six days after the onset was marked by an unusual amount of artifact due to eye blinking, and later it was recalled by the technician that the patient could not maintain eye-closure as required by the test. Eleven days later the eyelids were closed twice on command, and then the patient became unable to keep them shut. There was still great difficulty in fixing gaze. She could not inhibit inquisitive glances at any region undergoing sensory examination. Fourteen days after onset the lids could be maintained closed for up to 10 seconds, and protrusion of the tongue was probably within normal limits. Conjugate gaze to the left was now much easier. She was walking quite well. Motor power in the left hand was much better, and the patient was discharged.

Comment. This is an example of a rather short-lasting inability to maintain closure of the eyelids and protrusion of the tongue. Also the mouth could not be kept open initially, and voluntary control of respiration was impaired. There was difficulty in the fixation of gaze, and she could not prevent herself from looking toward the area undergoing sensory testing. Her mental state was marked by suspicion and flattened affect. Anosognosia was present.

Case 2: E. R., woman, aged 61. This patient, a known hypertensive for several years, developed a severe left hemiplegia shortly after arising one morning. Anosognosia and memory deficit were prominent at first, and no details of the early part of the illness could be recalled. When first seen two months later, the patient was disabled by a marked residual paralysis of the left arm and leg with which there was an associated cortical sensory deficit. The patient appreciated the paralysis to some extent but probably not fully. Blood pressure—150/100. Diagnosis: Cerebral thrombosis—right middle cerebral artery.

Special findings. The patient was sitting in a chair, wide awake, and able to converse quite readily, understanding and using language surprisingly well. However, she could not give the day or date and thought she had been in the hospital 27 days instead of just 13. The patient was right-handed. She was unable to keep the eyes closed on command but would merely blink them several times. She fully understood what was wanted of her and was able to repeat the examiner's command. She said, "How stupid can I get!" She blinked normally, spontaneously and to threat. Threatening her with the hand did not aid in maintaining the eyelids shut. She could wink well on the right but not on the left, whereas normally she could wink on each side. She could protrude the tongue briefly (3 seconds), but then it shifted from side to side and went back in again. After repeated careful instruction and several trials there was no improvement. The mouth could be held open for only four seconds approximately.

On being asked to look at the examiner's fingers, fixation was not steady, the eyes shifting several degrees in one or other direction. Conjugate gaze was full in all directions, except upwards, but the patient again could not maintain a deviated position of the eyes, which usually returned to and vacillated about the central position. Gaze to the left was full. The pupils were equal and reacted normally.

On testing the visual fields by stimulating simultaneously on the two sides, the patient invariably turned her eyes toward the moving fingers usually on the right and was unable to keep her eyes fixed on the examiner's nose. She was judged to have a left homonymous hemianopia.

The patient could take a deep breath but could not hold it. A prolonged "ah" sound was normally produced.

During sensory examination, since the patient could not close her eyes, she was asked to turn her head far to one side or the other. She was quite incapable of carrying out this part of the examination, and any attempt to manipulate her fingers or use a tuning-fork, pin, etc. caused her to turn to see what was going on. She understood what was desired of her and exclaimed, "My, I'm dumb!"

The only other evidence of this inability to sustain an act consisted of a striking tendency to make repeated brief gripping movements of the fingers when asked to squeeze the examiner's fingers with her right hand. She could not maintain a steady pressure.

A clear-cut mild grasp reflex was elicited on the right. A sucking reflex was not elicited. Number writing on the left palm was poorly interpreted as might have been expected, but the same was true on the right. During the interview the patient frequently cried uncontrollably. These last two points in the examination suggested involvement of the right side of the body, as well as of the left, but otherwise the right side seemed quite normal. Despite her tendency to tearfulness, the patient often made drily-humorous, facetious remarks which were probably out of character for her. The usual tests for apraxia were well performed.

Comment. In this case what might be termed the full-blown syndrome was present two months after the onset of the stroke. There had not been any recognizable previous attack involving the right side.

Case 3: D. R. (#642283), woman, aged 54. Three years prior to the present illness the patient had had a

stroke in which there developed a severe right hemiplegia and aphasia as the result of cerebral thrombosis. Recovery was only fair, there being a residual lameness and spasticity as well as impairment of ability to read and calculate. However, she managed to go shopping in the city by herself. The present illness began when the patient awakened one morning with slurred speech, inability to look to the left, drooping of the face, confusion, and incontinence. She was admitted to hospital six days later.

The patient was first examined personally 8 days after the onset of her present illness, which was also presumed to be due to cerebral arterial thrombosis. She was quite wide awake, comprehended speech well, and cooperated in motor testing. The most striking feature was the persistent and complete deviation of eyes to the right, and only with great effort could the eyes be brought as far as the mid-line, movement to the left past the mid-line being quite impossible. On one occasion, when roused gradually from sleep, the eyes were deviated temporarily to the left, but as she became fully awake, full displacement to the right again recurred. The head too was turned to the right. The patient also had anosognosia and autotopagnosia, not realizing why she was in the hospital (baking too much), and tending to disregard her left side, for example, putting on her spectacles with the left ear frame closed and repeatedly striking herself in the left eye with the closed frame. On attempting to comb with her left hand she had trouble finding her left hand. She knew the date but not how long she had been in the hospital. Despite all of the above abnormalities her talk made surprisingly good sense.

A left lower facial weakness, severe spastic dysarthria, and slight but definite dysphasia were noted. The left hand was slightly weak, but the left leg showed good power. The right limbs showed mild spastic weakness, a residue from the previous stroke. Sensation for pin prick, light touch, and vibration was impaired in both arms, left more than right, but the patient readily identified a key and coin in the left hand. She was able to walk unaided.

Special findings. The remarkable deviation of the eyes to the right has been described. In addition, the patient was quite unable to maintain the eyelids shut although momentary closing could be performed. The eyes were closed normally during sleep. Spontaneous blinking, as well as blinking to threat and bright light, was normal. When the examiner's fingers were held in front of the patient's eyes so as to present a persistent threat, the lids were held down much better. The pupils were equal and reacted to light. On testing the visual field of each eye singly, no defect was found, but on simultaneous testing, a left hemianopsia could be demonstrated. Winking was done with the right eye but not with the left. The tongue could not be held protruded for more than a second or so. The mouth was not maintained open for more than 4 seconds, and initiation of mouth opening was difficult at times. There was difficulty in the voluntary control of breathing, and she could neither hold her breath nor make a protracted "ah" sound. On being asked to take a deep breath she usually made forced expirations.

The left arm and hand tended to be neglected, and on asking the patient to extend both upper limbs only the right was held out, even after the patient was reminded to lift both. Therefore, persistence in maintaining posture of the left arm could not be tested satisfactorily. There was no difficulty with the ordinary tests for apraxia with either hand (clapping, saluting, combing, playing piano, eating, smoking, etc.). The patient could name objects readily but had great difficulty in reading and calculating. There was no evidence of visual agnosia.

Course. The patient was followed for a period of 19 days, and at the end of that time the eyes could be brought past the mid-line to the left only with great effort and then for but a moment. The marked deviation to the right at rest was no longer present, and the eyes tended to rest in forward gaze position. Two days after the initial examination the right eye could be held closed, but the left eyelid would raise after 2 or 3 seconds. This occurred repeatedly and uncontrollably. The tongue, mouth, and respiratory movements were unchanged. A few days later, the eyes could be closed quite well, but the left eye tended to open spasmodically every few seconds but was quickly shut again. The tongue could be held protruded only if deviated far to the right as if stuck out of the corner of the mouth. Even then it could not be held in a normal quiet fashion. After 10 days the tongue still behaved in the same way. The patient could not breathe in and out on command. At the end of two weeks the eyes could be maintained closed and the tongue protruded in approximately normal fashion. She still could not wink with the left eye.

Case 4: W. T. (L.S.H. #0132). This woman of 72 developed a severe left hemiplegia during sleep a few nights after a nephrectomy. Comatose at first, she improved gradually and was able to sit up in a chair. Examination 7 weeks after the stroke showed a frail woman tied in a chair. She was wide awake but disoriented for time and place. Comprehension of speech was satisfactory. However, at times she spoke a few words of jargon and tended to perseverate in naming some common objects, although others were repeatedly named correctly. (The patient was right-handed for everything.)

There was a most severe flaccid left hemiplegia involving face, arm, and leg. Pin prick and touch on the left side were totally unappreciated. The patient was quite unaware of the paralysis and the magnitude of her illness. The tendon reflexes were diminished on the left, and a Babinski sign was present. There was a left homonymous hemianopia.

Special findings. The head was turned to the right and the eyes tended to deviate to the right also. Gaze to the right was full and easy, whereas gaze to the left was extremely limited. Gaze upwards was impaired; downwards, full. Although able to close her eyes on command, the lids would open again after two seconds or so. She could wink with the right eye. The right eye closed much better than the left, but it would not stay closed. Blinking spontaneously to threat and on corneal stimulation was normal. On command the tongue was protruded, deviating to the left, but as the patient tried to keep it out, it either bobbed back in directly or

slowly twisted to the left and then gradually went back into the mouth. On being asked to take a big breath, she would make a small inspiratory movement and then expire forcefully. Yet the patient maintained that she understood the command in each instance and indeed could repeat the instructions.

In contrast to this difficulty, the patient readily carried out movements of the right hand and leg, and no apraxia could be demonstrated. Speech was clearly enunciated, and movements of the lips were limited only by the left sided weakness. The patient's feebleness and confusion seemed not to be of sufficient degree to be primarily responsible for the motor disturbance of eyes, tongue, and respiratory apparatus.

This patient died 7 months after the onset of the illness. Examination of the brain showed as the only lesion an extensive infarction involving almost the entire deep and superficial territory of the right middle cerebral artery.

Case 5: M. B., a woman, aged 47, suddenly suffered a severe left hemiplegia due presumably to cerebral embolism associated with rheumatic heart disease and auricular fibrillation. Recovery was slow and incomplete, and when seen 4 years later the left hand was useless and the left leg so weak that walking unaided was impossible. The right side of the body and speech had not been affected. On examination, the patient was quite bright, understood all questions, and her own language was well formed. The left upper and lower limbs showed increased tendon reflexes and moderate spasticity. Sensation for touch, vibration, position, and pain was absent or reduced on the left side.

Special findings. The eyes tended to deviate to the left at rest, and the head was turned down and to the left. The extraocular movements were full except for convergence. There was marked unsteadiness on fixing gaze laterally both to the right and left. The patient was unable to hold the eyelids shut for more than three seconds and, even after repeated practice, no longer than five seconds. She could wink with each eye but with uncertainty and some difficulty. On testing visual fields by confrontation the patient's eyes deviated to the stimulus several times, but with practice this could be prevented. A left homonymous hemianopia could be demonstrated on bilateral simultaneous stimulation. The tongue could be kept out for only two seconds at first and even after special effort could not be protruded for more than five seconds. She said that she drew the tongue back herself rather than that it went back in, uncontrollably. (Only this patient gave such an explanation.) The jaw could not be held open for examination of the throat. Respiratory movements could be controlled normally including breathing in and out, coughing, and holding the breath. On testing sensation the patient could not prevent her eyes from opening and looking toward the limb being examined, and finally a hand had to be placed over her eyes to complete the test. There was considerable difficulty in having her maintain a tight grip on the examiner's fingers, relaxation occurring after a few seconds.

The family was quite pleased with the patient's mental status. However, it had been noted that spontaneous speech was much less than formerly, and that memory, although good, was "slow" and the process of recall was unusually long. The former emotional buoyancy had been lost, the patient now being placid and dull. At times she spoke "childishly". Her husband had noted that at the movies her gaze would stray even in the most interesting part of the story. In comparing her present state with her former personality he felt that "a veil had come over her mind". During examination the patient laughed or was amused excessively several times, and it was difficult for her to hold her attention on one subject for a normal length of time.

Comment. In this case the several abnormalities under study had continued for 4 years instead of clearing during the period of recovery. Whereas, the maintenance of posture of eyes, tongue, and jaw was still impaired, respiratory control was adequate, and furthermore deviation of the eyes and head at rest was now to the left side rather than toward the right. There was some suggestion of inability to maintain a steady grip with the right hand. Attention could be focused only briefly on topics of conversation or on questions.

Case 6: E. W. (#75591 and L.S.H. #0337). This 60-year-old patient with rheumatic heart disease for 34 years and auricular fibrillation for 2 years had had a previous cerebral embolism with left hemiplegia in 1953. In the acute stage there had been anosognosia, deviation of the eyes to the right, and a left homonymous hemianopsia. During convalescence she had an attack of coma for a few minutes followed by choreic movements of the right side and spontaneous pain on the same side. Recovery was fair, the hand remaining weak and the patient's mental capacity being mildly impaired. On April 20, 1955, she suddenly developed a left hemiplegia and left sensory deficit. The eyes were deviated to the right. During the next three weeks motion returned in the left leg, but the left arm was still almost useless. On examination at this time, the patient was alert but did not recall the details of her illness or of the past week. She was quite aware of her paralysis. The extraocular movements were full but poorly sustained. She could not hold the left eye shut for more than a few seconds although the right was maintained shut. Spontaneous blinking, as well as blinking to threat and on corneal stimulation, was not unusual. However, she could not inhibit the blink to threat, and she could not hold the eyes open on command, the lids beginning to flutter rapidly. The tongue could not be held protruded, nor could the patient hold her breath or take a deep breath properly. She could not maintain a prolonged "ah" sound, the voice fading after about 5 seconds. The patient quite clearly said she understood what was wanted of her but just could not do as she was told. Another positive finding was that on testing the visual fields and being asked to gaze at the examiner's nose, she invariably deviated her eyes to the left to see the examiner's hand. After several trials and remonstrations she said again that she understood the command but could not prevent her eyes from roving. On testing sensation she could not keep her head turned to the right but invariably turned her head to see what was being done.

Case 7: F. C. (#871208), man, aged 58. This patient developed a stroke one morning shortly after arising and was found "unconscious" by his wife. Within 45 minutes he had improved so as to be able to move all limbs and sit up in bed. However, he was entirely unable to swallow, and saliva drooled from his mouth. Speech was a dysarthric unintelligible mumble, and if he tried to speak louder, it became a hoarse croak. Breathing was rattly due to secretions pooled in the pharynx. In addition there was a severe left facial weakness, marked weakness of the left hand, and mild weakness of the left leg. A diagnosis of cerebral thrombosis was made.

When first seen three days later he was not fully aware of his condition, and there was some imperception of the left side, for on inserting his artificial teeth he managed the right side normally but on the left they remained half out. In his drawings the left side was clearly, although only partially, neglected, and there was a left homonymous hemianopia on simultaneous stimulation in both temporal fields. In reading he missed the left side of each line. The patient was oriented as to time and for the period since admission. He was able to whisper or write details such as his age, work record, family, etc. He could read, identify pictures and name objects. His manner was suspicious, distrustful, and hostile. He became angry or winced excessively during insertion of intravenous needles, removing adhesive tape, testing two point discrimination, and even on tapping the reflexes. He threatened to "fix" or "get" one of the house officers who passed a stomach tube. Otherwise he was apathetic, sullen, unsmiling, and scowling. Once he managed to growl that he wanted to be left alone. His wife said that this was in no way part of his usual personality.

There was still weakness of the left face, and the left hand could grip only weakly. The tendon reflexes were brisk bilaterally, more so on the left; the plantar responses were down on each side. Sensation was difficult to assess; pin prick and vibration seemed to be perceived quite well on the left, but not movement or position. He could not identify an object in the left hand. An additional unusual feature was that on one occasion after he had held the arms outstretched on command, he lowered the right but held the left arm up for at least 15 minutes without fatigue and did not think to lower it.

Special findings. At the time of the first examination the patient was fully alert and wide awake. Despite the peculiar mental state he cooperated well even in those tests one would have expected him to reject. He was quite unable to maintain his eyes closed although he could close them for one or two seconds. He said he understood what was desired of him but just could not do it and did not know why. Yet spontaneous blinking of the eyes occurred, and they also blinked to threat or bright light. On forward gaze the eyes could not be fixed steadily. Ocular movement were not carried out well, especially conjugate gaze to the left which was uncertain, jerky, and required special effort. Yet several times he looked reflexly to the left without difficulty. The left pupil was a little larger than the right and both reacted well. The tongue was protruded well but could not be maintained out for more than a second or so. In an effort to keep it out, it usually deviated far to the right. There was again an uncontrollable inquisitiveness during sensory testing, and despite much urging to keep his head turned to the right he usually tried to see what was going on in the region of the examination. He could cough hard but could not produce a little cough. The customary tests for apraxia of the limbs were well performed.

The patient was followed for eight days, and during this time power in the left hand distinctly improved and swallowing began to return. However, the eyelids still could not be maintained closed, and gaze to the left was not easy. The tongue could be held out much better. The patient was still apathetic and yet oversensitive to mild pain. He neglected the left half of the body in dressing, and in testing 2-point discrimination he usually insisted that he felt two when stimulated with only one point. In spite of these gross abnormalities of higher function it was concluded that the inability to maintain eyelid, ocular, and tongue-movements was not attributable to lack of comprehension or short attention span.

Case 8: A. C. (#24614), woman, aged 54. This patient, having had rheumatic heart disease and auricular fibrillation for many years, in 1953 suddenly developed a right hemiplegia and aphasia which began to clear within two hours and had completely disappeared in 48. In 1954, 9 months later she abruptly developed a left hemiparesis which had almost cleared completely on admission 24 hours later. In addition to slight weakness of the left hand and lower face, it was found that she was unable to maintain the eyelids closed. She also showed a peculiar mental state, being sour, petulant, unsmiling, and suspicious, yet carrying out all sort of tests one might have expected her to refuse to do. She denied that she had had a stroke, did not appreciate that there was anything wrong with her left side, and said she would not feel right until she got out of hospital and back home. She tended to disregard the left side of her person and environment. When first admitted a left hemianopia was detected on simultaneous bilateral stimulation, but no other sensory deficit could be made out. She was wide awake, spoke fluently, understood everything, and there was no evidence of apraxia or agnosia.

This was one of the first cases to come under observation, and the examination did not include an appraisal of other features of the syndrome which were only noted later on.

Case 9: L. C. (#880868), woman, aged 73. This patient had had slowly progressive choreic movements for 10 to 12 years when one morning over a period of several hours she developed a severe left hemiplegia with mild but definite anosognosia. When seen 24 hours later she was wide awake, cooperative and spoke clearly. She was left-handed, but there was no evidence of aphasia or apraxia. The left side was almost totally paralyzed, and the previous choreic movements had ceased. Sensation was impaired on the left side. She obeyed all commands quickly and was able to shut the eyes and protrude the tongue, but she could not persist in either of these acts, though specially urged to do so.

Blinking was normal spontaneously as well as to threat and bright light. During sleep the eyes were closed in the usual fashion. The eyes tended to deviate to the right at rest, but with effort they could be brought almost fully to the left although not held there. It should be pointed out that in this case the presence of Huntington's chorea might have been responsible for the inability to persist in the above actions. However, with the return of motor power on the left side and a resultant increasing return of choreic movements, eyelid and glossal movements returned to normal.

Case 10: Man, aged 63. This patient awakened one morning with severe weakness of the left face and hand, and lesser weakness of the left leg. Speech was slurred. When seen by Prof. R. D. Adams one and a half hours later the left hand was still paralyzed, the left leg moderately weak. The patient was drowsy, slow, and not fully aware of the significance of his illness. He was unable to hold his eyes shut, could not sustain gaze in any direction, and when position sense was tested, he would open his eyes and, in spite of careful instructions to the contrary, look down to see what was going on. When examined seven hours later power was returning in the fingers of the left hand. The patient was slightly euphoric. The eyelids could be maintained shut normally and the tongue protruded well. It was striking that the patient could not keep the eyes open when the fundi were being examined. On forward gaze the eyes danced from side to side with a 2 mm. excursion and could not fix steadily. Conjugate gaze to the right was easier than to the left, and on gaze to the left the eyes moved better when not attempting to fix an object. Coughing, taking a deep breath, holding the breath, etc. were normal. Hand grips could be maintained normally.

Comment. This is an example in which most of the elements of the syndrome cleared in a few hours concomitant with diminution in the paralysis of the left hand. Unsteadiness of fixation of gaze had persisted. Reflex closure of the eyes on ophthalmoscopic examination was not seen in any of the other cases of this group.

Discussion

Review of literature

There are not many references in the literature which bear directly on the present subject. Inability to *maintain* closure of the eyelids on command has been mentioned only by Pinéas (7) and by Zutt (11) (see below). However, several authors have discussed complete inability to close the eyes on command, and it is not unlikely that at least in some instances these two abnormalities are but different degrees of the same phenomenon (as illustrated in case 1) in which the latter condition gave way to the former after a few days. Judging from personal experience total inability to close the eyes is much less common than failure to maintain them closed. In 1895 Oppenheim (6) reported that he often observed in pseudobulbar palsy that the eyes, although not closing on command, would do so reflexly but then only momentarily. Roth's (8) case 3 (1901) was that of a 63-year-old man with pseudobulbar palsy who on command was not only unable to close his eyes but could not carry out any eye movements unless he first fixed an object after which extraocular movements became full. The eyelids closed when an object was brought near to them. In 1905 Lewandowsky (3) briefly reported inability to close the eyes voluntarily with maintenance of normal reflex actions in a case of infantile double athetosis. About this time Liepmann outlined the principles of apraxia, and thereafter inability to close the eyelids was usually considered to lie in that domain. Lewandowsky (4) in 1907 under the title of "Apraxia of Lid Closure" reported the case of a man with a sudden left hemiplegia who for some seven weeks was unable to close the eyes on command. Yet blinking, spontaneously, to threat and on corneal stimulation was normal, and the patient slept with the eyes closed. When threatened with the hand, closure of the eyes could not be inhibited. Lateral conjugate gaze to the left was initially severely impaired, and turning the head to the left was also difficult. It was noted that the patient even early in his course could close the right eye when he imitated aiming with a rifle. The mind was fully clear. The author suggested that the disturbance was in the nature of apraxia, since on threat the eyes closed, demonstrating that the motor cortex was functioning and that the interruption had to lie at another "level" as in apraxia. He suggested that at least in some people praxis for lid closing lay in the right hemisphere. There was no mention of any other evidence of apraxia or of a disturbance of tongue-movements. Lewandowsky in referring to the patient's inability to close the right eye, as in winking, noted how people differ in the ease with which they can close one or other eye. In 1924 Pinéas (7) described a case in which inability to hold the eyelids closed was associated with a right frontal glioma which had invaded the corpus callosum. In the summary of his paper, Pinéas was said

to have referred to three types of Apraxia of Lid Closure, but no further details were given.

Schilder (9) in 1924 in a case of encephalitis periaxialis diffusa of rather rapid progression described an inability to close the eyes on command, whereas the eyes did close when the examiner's fingers were placed near the eye. Reflex blinking was unimpaired, and indeed the patient was unable to inhibit the response. There were no other definite signs of apraxia. Pathological examination showed extensive demyelination in both hemispheres, more on the left. The author thought the disturbance was an apraxia due to disease of the frontal regions and the corpus callosum. In 1926 he (10) reported a similar inability to close the eyes on command in chorea minor. Recently Zutt (11) (1950) reported three cases as follows: Case 1—Subarachnoid hemorrhage; left hemiplegia, head and eyes deviated to the right; on command, eyes could not be held shut; difficulting in holding mouth open, and in taking a deep breath; the tongue could not be held out, but went back into the mouth by itself; sense of movement impaired on the left side; anosognosia. The patient had a marked sucking reflex. Case 2—Subarachnoid hemorrhage with left hemiparesis. The eys could not be held shut. There was a most active grasp reflex on the left side. After a week these signs had cleared. Case 3—A man with progressive organic dementia showed a left hemiparesis and a marked grasp reflex bilaterally. He was unable to hold the eyes closed or the mouth open. The author regarded the disturbance of eye closure as a manifestation of the release of primitive motor patterns of the same class as the Grasp and Pursuit reactions and disagreed with the idea that it was in the nature of an apraxia. Thus in only one instance (case 1 of Zutt) has there been mention of abnormalities of both the eyes and tongue. That single case, reported very briefly, resembles those described herein although our observations were made before reading Zutt's paper.

Brief summary of case material

All of the patients included in this report have been unable to maintain voluntary closure of the eyelids for more than a few seconds. This was the first abnormality to attract attention; therefore it was the only criterion for the selection of the first few cases and later constituted the central feature of the syndrome. Difficulty in holding the tongue protruded was the second sign found to be present and was recorded in all but two cases. Thus the predominance of eyelid- and tongue-phenomena in the case histories presented is due partly to the way in which the study developed but probably also reflects their basic importance in the syndrome. However, a few cases, not described under Case Material, have been encountered in which these two signs were absent when other fragments of the syndrome were observed, although the former might well have been present too at an earlier stage of the illness.

One patient (case 1) was totally unable to close the eyes on command, and this persisted for only a few days. In 5 cases the eyes at rest were deviated to the right. In 9 of the 10 cases, lateral conjugate gaze to the left was impaired. Fixation of gaze was imperfect, the eyes shifting restlessly about the desired position of fixation in each of the 8 cases tested for this (ocular vacillation). Ability to take a deep breath, to hold the breath, or to produce a prolonged "ah" sound was affected in 5 of the 7 cases specially examined for it. A definite feature in 6 cases and in several others not included here was the patient's inability to prevent his eyes from turning toward the object being used to test the visual fields or toward the site of sensory testing. This failure of the patient to cooperate has, no doubt, plagued every neurologist's examination from time to time. Ability to inhibit blinking to threat was not tested for routinely and was recorded as abnormal only once. One patient was unable to hold the eyes open on command and began to blink rapidly. In 6 of the 10 cases anosognosia and other related parietal lobe disturbances were found. A left homonymous hemianopia was present in 8 cases. Although in case 5 the signs had persisted for 4 years, usually they were more transient, clearing over a period of hours, days, weeks, or months. A left-sided motor deficit was present in the majority of cases, yet most of the patients were able to be up and walking by themselves. Mental aberration which was present in all instances will be discussed below.

Whereas, the patient was unable to maintain

the eyes closed on command, reflex movements of the lids were not abnormal. Ordinary blinking was coordinated, synchronous, and judged to be at normal rates. The response to corneal stimulation was brisk bilaterally when corneal sensitivity was not impaired. When the examiner's fingers approached the eyes or a bright light was shone into them, a normal quick blink resulted. In the early stages, after finger threat, the eyes involuntarily opened again within a few seconds, but as recovery occurred the eyes sometimes were maintained closed after threat when they could not be held shut on ordinary command. There was no tendency to over-react to bright light, nor were the eyes forcibly closed during ophthalmoscopic examination, except in one instance and that after recovery. Although at first neither eye could be maintained shut, often within a few days the right eye could be held closed, but not the left. However, the closed right eye usually blinked vigorously as if it tended to open and was held closed only by special effort. Inability to wink with the left eye, a frequent accompaniment of left facial weakness of central origin, was usually present if the left lid could not be maintained shut. Whether the early recovery of right eyelid-closure correlated with previous winking abilities has not been determined, but such a finding would not be anticipated since most unilateral winkers normally can wink only with the left eye. In several cases it was ascertained that the eyelids closed normally during sleep.

Inability to *keep* the tongue protruded could be present when protrusion of the tongue was otherwise normal or nearly so. Deviation to the left was not prominent, nor was weakness; the tongue was simply withdrawn uncontrollably into the mouth after a few seconds. As recovery took place, the tongue instead of going directly in usually twisted to the left as an effort was made to keep it out, and when this failed it slowly went back in. It should be emphasized that in testing eye-closure and tongue-protrusion, as well as in testing extraocular and voluntary respiratory movements, the patients were carefully asked if they understood the test, and all answered quite definitely in the affirmative. They usually declared that they just could not do that which was demanded of them. Those patients who were unable to gaze fixedly at the examiner's nose during testing of the visual fields by confrontation or were unable to prevent the gaze from wandering to the site of sensory examination continued to show the phenomena despite repeated careful instructions and even remonstration. They said they could not inhibit the undesired activity.

Another phenomenon which might be related to the condition under discussion was seen in a lady of 67 who had suffered a severe left hemiplegia four years before. When under even mild emotional stress the tongue darted uncontrollably in and out of the mouth at the rate of two per second approximately. She could not maintain the tongue out on command. This constant postural instability of the tongue, although of extreme degree, bears a qualitative resemblance to the abnormal tongue movements described in our cases, and furthermore, the disturbance was associated with a non-dominant lesion.

In most cases, the syndrome dated from the time of an acute stroke. But in one case not included in this report, a lady of 70, subject to a slowly progressive dementia associated with evidence of bilateral neurological disease predominantly on the left side, displayed all of the abnormal signs indicating that chronic lesions are capable of evoking the syndrome. In this case, although the lower limbs were neither weak nor ataxic, the patient was quite unable to stand, the motor disturbance probably representing an apractic disorder.

Remarks concerning the main features of the syndrome

The findings in these cases would of course have special importance if one could discern a common principle or factor at work in each of the constituent parts of the syndrome. Inability to keep the eyes closed, maintain the tongue protruded, fix gaze centrally, deviate the eyes persistently to the left, hold the breath, and keep the mouth open, might all be considered as closely related in that a voluntary act, although carried out relatively perfectly, cannot be sustained. The new term *impersistence* is suggested for this failure to persist in a motor act. Inability to inhibit movements of the eyes during

confrontation-testing of the visual fields ("the attraction response") cannot easily be forced into the above pattern of abnormal activity. The same is true of the tendency to look toward the part of the body undergoing manipulation or sensory testing, behavior which we refer to as "peeking", a word used by several patients to explain this uncontrollable inclination.[3] However, in both of these abnormalities the same failure to maintain a motor set is prominent. The impaired ability to persist in maintenance of a posture in most cases did not extend to the limbs, and in so far as paralysis did not interfere, various positions and movements of the limbs were maintained except in cases 2 and 5 where the grip of the right hand could not be sustained but weakened periodically every few seconds. In case 6 the patient on one occasion held up his hand for some 15 minutes in catatonic fashion, quite the opposite of impersistence.

Nearly all of the cases encountered so far have been associated with a lesion of the non-dominant hemisphere and a gross neurological deficit on the left side of the body. In one case of Lewandowsky's, in Pinéas' case 1, and in Zutt's three cases the lesions were also in the right or presumably non-dominant hemisphere although the pathological process, tumor (Pinéas), subarachnoid hemorrhage (Zutt, two cases), and organic dementia (Zutt, one case), was not suitable for clinico-pathological correlation. In the present series focal cerebral infarction was probably responsible in all cases, and widespread secondary effects such as brain swelling, raised intracranial pressure, and distortion of subcortical structures were not important factors.

In 6 of the 10 cases described above, the cerebral lesions were probably unilateral, the right hemisphere alone being affected. The same has been true in several other cases not included in the case reports. In case 4 neuropathological examination showed a single region of infarction limited to the cortical and subcortical tissue in the territory of the right middle cerebral artery, the opposite hemisphere beng grossly normal except for convolutional atrophy. Therefore, it is reasonably certain that a lesion of only the non-dominant side can evoke the syndrome. (The progressive atrophy with advancing years is discounted.) In four cases previous strokes involving the dominant hemisphere had occurred in addition, or abnormal signs were present bilaterally when the patient was first examined. Prior damage to the dominant hemisphere did not appear to influence the syndrome in any clearly recognizable fashion although in those cases the abnormal signs cleared up more quickly than in the group with unilateral non-dominant lesions. However, the number of cases is too small for conclusions to be drawn.

In a further effort to determine if the syndrome was specifically related to non-dominant brain lesions, a control group of more than 30 dextroplegics with dysphasia was examined. In most instances impersistence was absent, and it was remarkable to find that such patients among their earliest responses could hold their eyes shut and their tongue protruded. Indeed, they were apt to perseverate and to maintain eye-closure and tongue-protrusion for much longer than desired. In this, one discerns behavior quite dissimilar to impersistence, namely, an undue persistence or perseveration which is a fundamental feature of lesions of the dominant hemisphere. However, there were a few exceptions. In one case of right hemiplegia with a rapidly clearing dysphasia, several elements of impersistence were quite easily elicited, but some uncertainty as to the lateralization of cerebral dominance arose when the patient during examination proved capable of writing with her left hand and stated that although she regarded herself as completely right-handed, as a young girl she also wrote with her left hand for no other reason than that it was so easy. In severely dysphasic patients, occasionally an attraction response or inability to keep the eyes closed or the eyes steady on forward gaze was present, but in most of these cases comprehension and cooperation were usually greatly impaired. Total inability to protrude the tongue is not

[3] It is realized that the terms impersistence, attraction response, vacillation, and peeking do not have a scientific ring. They have been retained chiefly because of their descriptiveness but also because they are lacking in any connotation as to the nature or mechanism of the disturbance to which they refer.

uncommon in aphasics, but this well-recognized disorder is not accompanied by the various constituents of the impersistence-syndrome, and when seen during the recovery stage impersistence of tongue protrusion has not been encountered in aphasics. In conclusion it would probably be accurate to say that so far the syndrome has appeared to be reliably related to a disturbance of the non-dominant hemisphere, but examination of a larger series of dextroplegics of all types and degrees of severity should be undertaken.

At the same time it must be emphasized that by no means all left hemiplegics show "impersistence", and many cases in which it was absent have been encountered. The explanation for this variable occurrence is not evident, but a few perhaps relevant observations might be included here. In one striking case seen shortly after the onset of a severe left-sided paralysis due to cerebral embolism all of the above features of impersistence were lacking. Post-mortem examination showed a softening which involved the lenticular nucleus and the adjacent central white matter, but surprisingly spared the cerebral cortex, at least grossly. Other cases in which a left hemiplegia has been due to lesions in the cerebral peduncle or brain stem, i.e., the cerebral cortex has not been involved, have likewise shown none of the abnormalities under discussion. All of this suggests that the syndrome reflects cortical involvement although it is appreciated that any attempt to separate cortex sharply from central white matter is artificial. However, the presence or absence of cortical lesions is probably not the whole explanation for the occurrence of impersistence in one left hemiplegic and not in another since some of the cases in which it was absent have had sensory changes, strongly indicating cortical lesions. No prognostic value attaches to the syndrome, recovery of motor function being unrelated to its presence or absence.

Left hemiplegics with impersistence differed from left hemiplegics without impersistence, in that they seemed to display a more severe mental impairment. In several cases of left hemiplegia with marked motor and sensory changes but no impersistence, the patient was unusually alert, well-oriented, sensible, and anosognosia was absent. On the other hand, in nearly all of the 10 cases described in detail above, some degree of anosognosia, confusion, and impairment of memory was present, and the question of the relation of these to the various signs of impersistence was raised.

As already pointed out, drowsiness, memory defect, and inattention in the patients with impersistence were not prominent findings, and in no case did they seem to be the basis for the syndrome. The patients usually retained and repeated the commands and assured the examiner they well understood what was desired of them. Furthermore, in a few cases (see cases 2 and 5), frank anosognosia and disregard of the left side were either absent or only questionaly demonstrable at a time when three or four elements of impersistence could be elicited. Therefore, it is probable that impersistence can occur independently of any clear-cut evidence of the highly characteristic disturbances associated with non-dominant parietal lobe lesions. At the same time there is no doubt that patients with impersistence are impaired mentally, compared with their previous normal performance. To complicate matters further, left hemiplegics with little or no evidence of either anosognosia or impersistence have shown intellectual and memory faults, suggesting that the mental and memory changes may not be a specific part of impersistence or anosognosia but only a coincidental occurrence resulting from damage to adjacent cerebral tissues. The non-dominant parietal-lobe syndrome has not been encountered in the absence of some degree of impersistence, but the number of observations is too few to conclude that this relationship is constant.

So far no attempt has been made to elucidate and characterize, by using psychological tests, the mental abnormality encountered in association with impersistence. It would be most interesting if it turned out that the same common denominator underlay both impersistence and the accompanying altered mental state. A study of the results of lesions of the non-dominant hemisphere might be regarded as having some special advantage since, in so far as speech is left relatively intact, investigation of cerebral function should prove simpler than would be the case in disturbances of the major hemisphere when communication with the

patient as a rule becomes difficult. As the same physiologic laws might be expected to govern the activity of both hemispheres, any principles deduced from observing the effects of lesions of one side should be more or less applicable to the problems of the opposite. A complicating factor in unravelling the basic nature of the mental change seen with impersistence is the concomitant presence of non-dominant parietal lobe symptomalogy, and in order to determine if the mental change of impersistence is in any way specific, it will be necessary to study the psychological characteristics of impersistence when anosognosia and allied disturbances are present as well as when they are absent. In my experience, patients with non-dominant parietal lobe lesions associated with anosognosia, autotopagnosia, constructional apraxia, and disregard of the left side nearly always show impairment of "general mentality", as judged by their everyday activities. When marked anosognosia is present, disorientation, faulty memory, depression of affect, loss of spontaneity, disinterestedness, and lack of appreciation of the total personal situation may be prominent findings. In milder cases the patient, while seemingly aware of his illness and his paralysis, will show more subtle evidence of inability to comprehend fully the seriousness of the disability and its prognosis, and recently memory will be impaired. This latter group, really "dements of mild degree", can appear quite normal to the physician whereas close relatives of the patient usually realize the change which the stroke has wrought. In several such cases impersistence too has been present to a minimal extent, suggesting again some relationship between the two, but this point needs to be examined further. At present there is being devised a battery of psychological tests for use in determining the occurrence of any fundamental feature of impersistence in the dementia associated with non-dominant hemispheric lesions.

Aberrations of affect were prominent in some cases of impersistence while lacking in others, and since few pathological studies have been possible, it is not clear if the emotional disturbances were determined by the location or the extent of the cerebral change, by previous personality traits or by still other factors. The patient in case 1 was hostile, suspicious, cold, unsmiling, superficial, and incapable of any warmth or depth of feeling. In case 7 the patient was sullen, scowling, suspicious, distrustful, hostile, bad-tempered, and threatened to "fix" or "get" one of the house-officers. He was most sensitive to any stimulus, and insertion of intravenous needles, removing adhesive tape, testing 2-point discrimination, and even tapping the reflexes caused him to wince excessively and explode in anger. His wife said this was not his usual personality. In case 8 the patient was sour, unsmiling, suspicious, petulant, and insisted on going home. The three patients just described had severe anosognosia, and some of their behavior might be traceable to their failure to appreciate the need for medical care. The other patients were more cooperative, pleasant, and docile. In case 5 the patient was unable to maintain her attention on topics of conversation or on the movies, and this might possibly be a reflection of the same basic abnormality which interferes with persistence of eye closure, etc. With the present meager data, further discussion here of the mental change or "dementia" associated with left-sided brain lesions and impersistence is not warranted. Impairment in the performance of non-language tests (5) has been found in right-sided lesions, but this no doubt is only part of the story.

There are several additional problems concerning the syndrome which so far have not received an exact or final answer. For example: What constitutes the most complete form of the syndrome, and, on the other hand, which are its mildest manifestations? Which of the components are to be considered its central or fundamental features? Are the various abnormal signs which constitute the syndrome related to one another? As for the full-blown picture it probably is well exemplified in case 2, which was characterized by almost all of the signs to which reference has already been made: difficulty in maintaining the eyes shut, the mouth open, and the tongue protruded; impaired ability to maintain a steady hand grip; inability to fix the eyes steadily on forward or lateral gaze. The breath could not be held. The "attraction response" and "peeking" were easily demon-

strated. Mentation was clearly altered, the patient displaying impaired memory, poor judgment, facetiousness, and tearfulness, as well as other indications of intellectual and emotional impairment.

It has not been possible to determine with certainty the minimal manifestations of the syndrome. Likewise it is difficult to say which of the phenomena are to be regarded as comprising its core. Inability to maintain the eyes closed and the tongue protruded has been found several times when the attraction response and "peeking" were absent, particularly in the period immediately after the onset of the stroke. On the other hand, the picture could be just the reverse, particularly in more chronic cases, and these findings would suggest that the two pairs of signs were perhaps unrelated. However, frequently all were present together. Difficulty in holding only the left lid shut, the right closing normally, is a phase in the recovery from bilateral impairment of eye-closure and has the same connotation. In one case, inability to hold the tongue protruded was the only abnormal sign other than restriction of left lateral conjugate gaze. Inability to fix properly on forward gaze and difficulty *maintaining* conjugate deviation of the eyes to the left have been found in the late states of recovery, suggesting that they too might be regarded as cardinal features. Persistent conjugate deviation of the eyes to the right, of cerebral origin, although not always present, was an indication that other components of the syndrome would be found. Simple restriction of left lateral conjugate gaze without unsteadiness of gaze was seen in the absence of any other evidence of impersistence and need not be considered as a specific part of the syndrome, particularly since it is also seen in dominant lesions. Inability to wink with the left eye, when such was possible previously, usually accompanies impersistence but was also encountered as an isolated defect. Difficulty in holding the breath was an inconstant sign.

As pointed out above, mental deterioration has always been detected in the full-blown syndrome. Frank anosognosia has usually been accompanied by impersistence, but the reverse has not been true, anosognosia often having disappeared rather completely at a time when many of the other component signs remained. At one stage of the study it was felt that impairment of steady conjugate gaze by itself always indicated that the mind would be affected too, and for the most part this has proved reliable although a few exceptions have been encountered. It must be concluded that at present it is not possible to state conclusively which of all the manifestations are to be regarded as the basic or central features of the syndrome, but impersistence of eye-closing and tongue-protrusion are probably the most important.

The conclusions just drawn are based chiefly on cases of cerebral infarction, and it should be added that observations made in a patient with a cerebral hemorrhage have provided exceptions to the above "rules". For example: in a young woman with an unexplained right intracerebral hemorrhage which was evacuated at surgery, examination showed total inability to close the eyes (later the right one closed satisfactorily), deviation of the eyes to the right at rest, and a tendency to the attraction response, but there was no unsteadiness of forward gaze and no "peeking", i.e., the signs just described as among the more durable were lacking. The patient was quite alert but had anosognosia. On one occasion when she was unable to hold the eyes shut, gentle tapping on the eyeballs led to a very forceful reflex closure of the eyelids following which the patient could hold her eyes closed for as long as one minute. Cases of proved intracerebral hemorrhage with maintenance of alertness are quite uncommon so that it may be difficult to check these observations. However, one might anticipate that an intracerebral hemorrhage would scarcely ever duplicate the neurological picture produced by a softening.

In summary, the observations to date can be condensed as follows:

1) The fully-developed picture of impersistence is comprised of the several component signs which have been enumerated above. The fundamental disturbance might be regarded as a failure to maintain a motor set, or an interference with the persistent control of a motor act, or in the case of the "attraction response" and "peeking", a form of distractibility. The relation of the signs to one

another has not been settled, and it may finally turn out that rather than all being interrelated the ocular and lingual disturbances, for example, will be quite distinct from "peeking" or the mental changes; indeed the several signs may be quite separate with their only common feature being their origin as the result of a non-dominant lesion. The attraction response, "peeking", and inability to maintain a steady gaze may be present when difficulty in keeping the eyes closed, the tongue out, or the mouth open is absent, and *vice versa*. At present I am inclined to the view that, in so far as the various signs have been rather regularly associated, they bear at least some relationship to one another.

2) The clinical picture is usually the result of a lesion of the non-dominant cerebral hemisphere. However, not all left hemiplegics show the syndrome, and in many with severe motor and sensory deficits, it is entirely in abeyance.

3) A disturbance of the mind is regularly encountered, whereas left hemiplegics without the syndrome are as a rule clearer mentally. Faulty memory, poor judgment, and failure of the patient to appreciate his physical limitations are commonly present.

4) Pathological studies are lacking for the most part, but from limited observations the responsible lesion involves cortex or the superficial part of the hemisphere rather than the deeper cerebral structures or the brain stem. The anatomical basis, if there is one, for the presence of the syndrome in one left hemiplegic with cortical deficit and its absence in another so far has not been studied because of the survival of most of the patients. Right-sided intracerebral hemorrhage may produce a syndrome somewhat different than superficial cerebral infarction.

5) Anosognosia, although often a prominent finding, has not infrequently been absent or only faintly present.

6) The syndrome can be quite evanescent in the same fashion as deviation of the eyes, apraxia, and many non-dominant parietal lobe signs. However, it can persist for months or years.

7) Most patients, when asked specifically about the involuntary opening of the eyes, state that "they" do not do it but rather that it occurs in spite of them.

The nature of impersistence

The great difficulty met with in attempting to classify the nature of impersistence, or to discover a ready explanation for it, needs no mention. In the present study it has not been related to forced grasping or reflex-sucking as was inability to keep the eyes closed and the tongue protruded in Zutt's cases, and for this reason it is unlikely that a return to more primitive or infantile neurological reflexes is the basic principle involved. Is it an apraxia as Lewandowsky, Pinéas, and Schilder concluded in regard to the failure of eye-closure? If apraxia consists of an inability to perform a willed act in which the motor deficit is not explained by paralysis, sensory deficit, dementia, ataxia, or agnosia, the disturbance under consideration would not be apractic in nature since the patient usually could briefly perform the act (eye-closure, tongue-protrusion) satisfactorily. It is questionable whether apraxia should be extended to cover a deficit in the *maintenance of a posture*; yet it could well apply to a total inability to close the eyes from which, as has been indicated, the impersistence of lid-closure was derived in at least one case (case 1). However, failure to keep the tongue out so far has not been preceded by complete inability to protrude the tongue.

In most cases, the patient was able to perform the more commonly used tests for apraxia (saluting, use of scissors, combing hair, playing piano, writing, etc.) so that impersistence seems in no way to resemble ideational apraxia which is closely tied to temporoparietal lesions of the dominant hemisphere. On the other hand, it does have some features of limb-kinetic apraxia which apparently results from lesions of the premotor region. Impersistence in this respect could be considered as an apractic disorder arising on the basis of a premotor lesion of the non-dominant hemisphere. Since the nature of apraxia in all its manifestations is so poorly defined, further comparison would not be profitable here, and the conclusion that impersistence appears to contain elements of apraxia must suffice

for the present. The above remarks chiefly pertain, of course, to abnormalities of eye-closure and protrusion of the tongue, and the same would not apply to the attraction response, "peeking", etc. unless the inter-relationship of all the various signs within the syndrome could be demonstrated.

Since in impersistence, the various motor acts can be carried out but not sustained, the possibility that psychological factors are responsible immediately comes to mind. However, as already emphasized, the syndrome can occur when the patient not only is alert but displays a satisfactory attention span and a good (although not normal) memory; therefore, if abnormal mental function plays any part, the disturbance must be in spheres other than these. Definition of the participation of psychological events or processes, normal or abnormal, in any motor act is greatly limited by lack of knowledge in this field, and the problem will not be pursued further in regard to impersistence. It is probably correct to say that although mental impairment is associated with impersistence, the two are not causally related.

Specially involved in the motor deficit of impersistence are those parts of the somatic musculature of each side of the body which ordinarily act together bilaterally under the influence of both cerebral hemispheres, namely, the musculature of the eyes, upper part of the face, the tongue, and the respiratory apparatus. Moreover, these bilaterally co-ordinated movements are held to be fully represented in each of the cerebral hemispheres, and it is usually assumed that when one side of the brain is diseased, the other side is capable on its own of subserving satisfactorily the motor activities of the parts in question. It is, therefore, possible that the abnormality in impersistence is linked to the change whereby bilaterally controlled movements come under the dominion of one hemisphere. The tendency of impersistence to be evanescent would favor this concept.

The failure of the syndrome to appear with lesions of the dominant hemisphere must mean that the right hemisphere normally plays a dominant role in the control of lid-closure and the maintenance of tongue protrusion, etc. The "praxis" center for these movements may well be in the non-dominant hemisphere as Lewandowsky suggested for lid-closure. Therefore, as the result of damage to the right hemisphere, the left motor cortex in taking over control would find itself temporarily or permanently incapable of carrying out the required motor activities in many cases. Perhaps, depending on the balance of control normally present between the two sides, substitution can be rapid or delayed, complete or incomplete, and indeed this could be one explanation for the occurrence of impersistence in some left hemiplegics and not in others. Generally speaking, individual variations in the degree to which each hemisphere selectively subserves the various cerebral functions must contribute to the striking clinical variations in cases with approximately the same lesions. Despite this variation it is uncommon apparently for the left hemisphere to have predominant control of lid-closure. Impersistence could be instructive in studying the mechanism by which the remaining healthy cerebral hemisphere assumes the function of its opposite damaged counterpart.

The ability to close the eyes, protrude the tongue, etc., combined with a failure to maintain these positions raises the question as to whether or not the syndrome is but a reflection of "weakness" or, expressed more appropriately, a partial uniform paralysis of cortical origin in the Jacksonian sense. There are several indications that this might be the explanation despite the obvious fact that eyelid closure, for example, requires a minimum output of energy. It must be remembered in this connection that the various motor acts (holding the eyelids closed, protruding the tongue, fixing gaze, keeping the mouth open, holding the breath) are not habitual, automatic or much used under ordinary circumstances; therefore, as tests of motor function they are of a special kind and may require relatively complicated nervous arrangements although normally carried out without difficulty.

Whereas, at the onset of the illness neither eye could be held shut, during recovery it often became possible to maintain the right eye closed several days before this was possible on the left side. If the motor cortex in each hemisphere, while controlling the musculature in question bilaterally, exercised this control

predominantly contralaterally, then in the case of a right-sided lesion, eye-closure on the right would be expected to recover more quickly than on the left side, i.e., the "weaker" or more paralyzed side. The sequence of events during recovery should surely provide a clue to the nature of the disorder. Furthermore, while brief closure of the lids seemed of good strength in some cases during impersistence, in others a definite weakness could be detected. Complete lid-closure on threat or during spontaneous blinking is by no means an indication that voluntary motor power is intact even when no lid lag can be detected. Also, as has been pointed out, inability to wink on the left side usually paralleled impersistence of lid-closure. Furthermore, when total inability to close the eyelids on command is present in facial diplegia of cortical origin, movements of the upper facial musculature and orbicularis oculi are clearly weakened, and as has been mentioned, impersistence in some cases has been derived from total inability to close the eyes. In all these respects, the syndrome under discussion appears to represent impairment of *motor* control at a cortical level. Somewhat against this explanation is the observation that during recovery the patient may be able to maintain the lids closed satisfactorily if that is the only command given, whereas on concentrating during sensory examination or the performance of additional motor acts the eyes may open and impersistence reappear. This would suggest that attention or some other "more mental" faculty was at fault, which would be in agreement with the finding that impairment of the mind has been present in almost all cases. However, the tendency to open the eyes during sensory examination could also reflect a reduced cortical motor representation with the result that a fuller "concentration" is required to *maintain* closure of the eye. Stronger evidence against impaired cortical *motor* control as the mechanism is the finding that protrusion of the tongue and opening of the mouth may be of normal strength when impersistence is well developed. Similarly, the fact that the patient, when unable to maintain the lids closed, can quickly reclose them once they have opened is not reminiscent of weakness even of cortical origin. (It has been assumed here that the chief mechanism of recovery is the assumption by the left hemisphere of the duties of the damaged right rather than the return of function in injured fibers in the region of the infarct. Both factors are probably operative in the majority of cases.)

Incriminating the frontal region further is the observation that impairment of lateral conjugate gaze was found in almost all cases. Since the basis for this disturbance lies in a lesion of the opposite cortical area 8, it is suggested that a mid-frontal lesion at least should prove to be a common pathologic finding in impersistence. Whether or not a lesion in that situation could produce the entire clinical picture cannot be stated, but most likely the attraction response and peeking represent a disorder of more than the frontal motor cortex.

Reference has already been made to motor disorders of the eyes and tongue in lesions of the dominant hemisphere, and some of the ways in which they are distinct from impersistence should be noted. In aphasics, with right hemiplegia, frequently the eyes cannot be moved voluntarily in any direction, and fixation of gaze is virtually impossible rather than being interrupted by vacillation. Of course, in dextroplegics the eyes may be deviated conjugately as in left hemiplegics. Often the tongue cannot be protruded or even moved from side to side, but this state so far has not been found to proceed impersistence of protrusion. As a rule, even when comprehension is greatly reduced, the eyes can be closed and maintained closed without difficulty. Indeed motor perseveration is the rule rather than impersistence.

An unusual event, referred to previously, was seen in the case of a young woman with an intracerebral hematoma. Some two weeks after surgical therapy, the patient showed striking impersistence of eye-closure, but after gently tapping repeatedly on her eyeballs to evoke a strong reflex blinking response, she suddenly became capable of holding her eyes closed almost indefinitely. It was as if a neuronal pathway had been dramatically established.

Total inability to close the eyes voluntarily

The relation of *total* inability to close the eyelids to the syndrome of impersistence has

so far been referred to only briefly, and a few further observations on this topic might well be appended here.

In case 1, total inability to close the eyelids voluntarily gave way to difficulty in maintaining the eyes shut, indicating that the two conditions are but different degrees of the same disturbance. Another somewhat similar case has been seen in which a man aged 50 developed a left hemiplegia with a dense sensory loss, anosognosia, spatial disorientation, and hemianopia. When examined 48 hours from the onset, he was quite unable to close the eyelids, and on striving to do so the eyes tended to roll haphazardly in various directions. There was no aphasia or apraxia. The patient was not examined later. These observations along with those previously described by Lewandowsky, Pinéas, and Zutt indicate quite clearly that total inability to close the eyes can be the result of a right-sided brain lesion in right-handed individuals. Failure to close the eyes on command has also been encountered under somewhat different circumstances, and the various clinical pictures must be differentiated. In two cases of bilateral cerebral embolism there had resulted a virtually complete paralysis of all voluntary functions of the facial musculature with maintenance of reflex activity. The patients could not close the eyes, shut the mouth, show the teeth, move the tongue, make a sound or control respiratory movement. Saliva ran from the mouth. Yet spontaneous eye-blinking was normal, the patients smiled broadly and reflex swallowing was observed. The extraocular movements were full. Gaze could be held steadily, and there was no evidence of impersistence. Both patients used a typewriter satisfactorily for purposes of communication. It is presumed that a lesion of the lower precentral motor area had occurred bilaterally accounting for this particular type of inability to close the eyes voluntarily. The complete preservation of the extraocular motor activity was surprising. The relation of failure to close the eyes in these cases to impersistence is an important matter, for, as already mentioned, in representing the most advanced stage of impersistence these cases may indicate that the latter syndrome is in the nature of a partial paralysis, i.e., a motor deficit primarily.

In another case of complete inability to close the eyes, in which there were no other signs of impersistence, a lady aged 72 awakened one morning with almost total paralysis of the left leg and a severe ideational apraxia of both upper limbs. Speech was not affected. A grasp reflex was present bilaterally and was so prominent that when the right hand was raised, as in eating, it was immediately seized by the left. The patient could not close her eyes on command but could hold them shut if the lids were made to close reflexly. This case was especially interesting in that the non-dominant hemisphere was affected without any signs of impersistence, while total inability to close the eyes was associated with a widespread ideational apraxia which had appeared in the absence of dysphasia. Cases similar to Lewandowsky's (double athetosis) and Schilder's (chorea minor), in which eye-closure was impossible, have not been seen personally. Another obvious cause of faulty eye-closure, which need scarcely be mentioned, is bilateral peripheral lesions of the facial nerve.

It is evident, therefore, that there is more than one underlying basis for inability to close the eyes voluntarily, and this fact must be kept in mind when attempting to relate the phenomenon to impersistence.

Summary

1. During the examination of a series of cases of cerebral vascular disease, attention was attracted to an inability to maintain the eyelids closed although brief closure of the lids was not impaired. This disturbance was found to be associated with left hemiplegia and a lesion of the non-dominant cerebral hemisphere. It was further observed that other anomalies of willed movement were associated, namely, inability to keep the tongue protruded and the mouth open. The eyes could not fix an object steadily (vacillation). Conjugate gaze to the left was incomplete or impaired or the eyes were deviated to the right in the resting position. When the visual fields were being tested, the eyes could not be held centrally but were drawn toward the stimulating object, a disturbance which has been called the "attraction response". During sensory examination of the limbs the patient could not keep the head turned away or the eyes closed but irresistibly turned to see what was going on.

This has been termed "peeking". Furthermore, in some cases the hand grip could not be maintained firmly, and breathing could not be controlled voluntarily. For this entire syndrome the term "impersistence" has been coined in order to designate a failure to persist in an act although initiation of the act seems normal. The mentality usually shows evidence of insult.

2. The syndrome is closely tied to a lesion of the non-dominant hemisphere.

3. The central features of the syndrome are probably inability to maintain the eyes closed and the tongue protruded. Impaired fixation of ocular gaze, the attraction response, and "peeking" are seen only in the fully developed picture.

4. The nature of the disturbance has been briefly discussed. A reduction in cortical motor representation is favored as an explanation. The disorder is akin to apraxia.

Addendum

After the preparation of this paper, my attention was drawn to a recent report in which inability to maintain the eyes closed and the tongue protruded has been described independently. Berlin (1) in focusing special attention on the abnormality of lid-closure concluded that the disturbance was "compulsive" in nature. He too pointed out the correlation of the phenomena with lesions of the non-dominant hemisphere.

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PHOTOMICROGRAPHIC STUDIES ON THE NAIL BED CAPILLARY NETWORKS IN HUMAN CONTROL SUBJECTS[1]

WILLIAM C. GIBSON, P. G. H. J. BOSLEY, AND R. S. GRIFFITHS

INTRODUCTION

An investigation is being undertaken in this laboratory into the nail bed capillary patterns of mentally ill subjects. In an attempt to remedy one of the deficiencies found in many such previous surveys of mental patients, a study has been made first of over 400 healthy controls. In order to proceed with the control survey it was found necessary to develop a simplified photomicrographic method for the objective recording of the nail bed capillary patterns since the many cumbersome apparatuses used in the past would not lend themselves to later routine use in a mental hospital.

Since the pioneer work of Lombard (25) in this field, many attempts have been made to record the capillary nail bed patterns in humans by photomicrographic means (2, 7, 9, 13, 15, 16, 17, 18, 19, 20, 21, 23, 30, 31, 35, 38, 39, 40). Although it is relatively easy to see the capillary network and to observe the patterns assumed by the capillary loops in different subjects, it is much more difficult to reproduce these patterns photomicrographically. It is for this reason that it is difficult to correlate much of the work which has been reported in the medical literature to date. In many cases also the photomicrographic field was so limited that only a small number of capillaries was reproduced. No attempts were made in the past to reproduce a clear picture of the capillary network throughout the entire width of the nail bed. The work of King (22) on the capillaries of the gum as it overlies the tooth is very instructive. Subjective methods of illustrating the capillaries and the lack of pericapillary detail and of accurate scales in such illustrations have made it difficult to derive statistical information from much of the large volume of literature on this subject.

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MATERIALS AND METHODS

Because we desired eventually to photograph the nail beds of mental patients, it seemed essential to arrive at a solid piece of apparatus in which the patient's finger could be firmly clamped to avoid vibration through tremor. A focusing technique had to be developed also, which would be both direct and accurate, in order that repeated photomicrographs would not be called for on possibly disturbed patients. For the same reason the exposure time had to be reduced to the shortest possible interval.

Stereoscopic binocular dissection microscope. With most of the standard capillary microscopes available it is possible to study and photograph only a few capillary loops in detail. In order that we might have a larger field available, in relatively clear detail, and in order to take into account the shape of any finger, we modified a Zeiss Opton standard binocular dissecting microscope (Plate 1). The main support was machined for its entire length to allow of complete freedom of movement for the microscope. It was fitted with an extra arm into which was inserted the finger clamp assembly. By means of adjusting screws complete range of movement was possible for both the microscope and the finger clamp.

Camera and attachments. A 35 mm. Leitz Wetzlar D.R.P. camera with an exposure range up to $\frac{1}{500}$ of a second was used. The normal camera lens was replaced by a Leitz Mikas attachment with an exposure range up to $\frac{1}{125}$ of a second. A small ocular, built into this attachment, enabled a final camera focus to be made accurately after the initial visual focus had been established using the opposite microscope ocular.

Light source. This was from a standard Leitz Wetzlar skin and capillary microscope lamp. The bulb is a G.E.C. microscopic, of 50 watts and 6 amp. (G.12.1803D). When using this lamp it is necessary to insert some form of

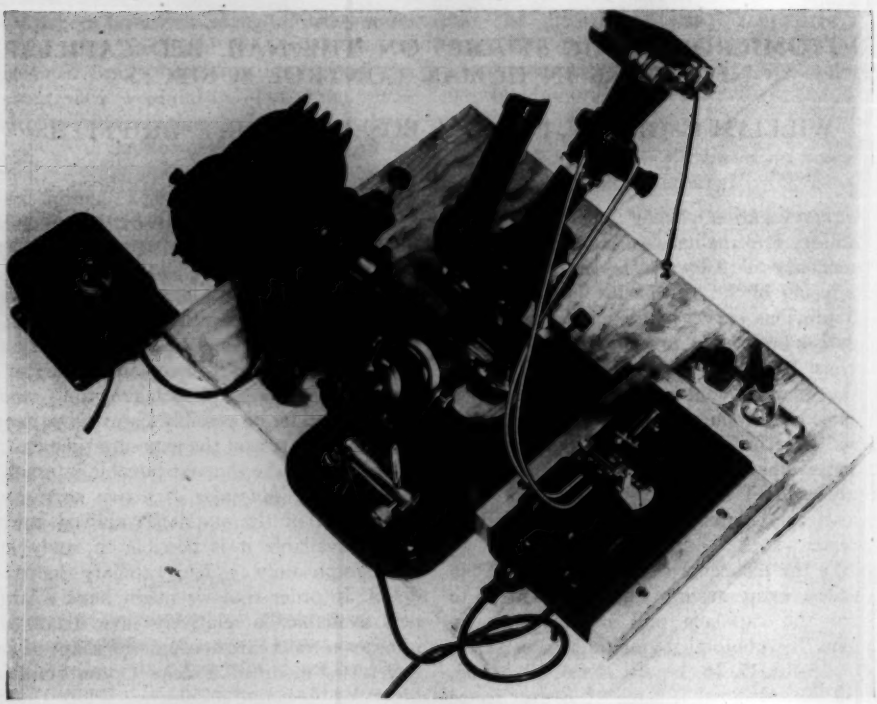


PLATE 1

heat-absorbing glass filter, of the grey-green type, to protect the subject's skin. We have found that the majority of subjects can tolerate the heat, using this filter, up to 5 amp. This, of course, varies with the patient and can be adjusted accordingly. We tried always to obtain maximum illumination of the nail bed. The transformer is a Hammond (V.A. 45, primary volts 110, cycles 25). A second light source was occasionally found necessary to give extra illumination, from a different angle, without any appreciable increase in heat on the finger nail bed. This was a Bausch and Lomb type (44-4244) fitted with a microscopic bulb (18A, 110/28) (6V medium. pf base down. 18A—110 bulb. SR 6A filament). The Jefferson transformer (cap V.A. 108, primary volts 115, cycles 60) gives light of three different intensities. Both light sources are completely mobile in all directions.

Film. The process by which we finally arrived at a suitable film may be of interest. It occurred to us that if we obtained a color positive film of the capillary network and contact printed back onto a sensitive black and white negative, inserting a green filter between the light source and the color positive, we would obscure all red light from the capillary region on the negative and have a dark background. Subsequent printing from this negative would yield black capillaries on a relatively clear background. Daylight color, as opposed to tungsten color, was used because of the greater red and yellow contrast available. A very suitable film was suggested to us by the Medical Division of Eastman Photographic Company, in the form of Linagraph Ortho, a very fast orthochromatic film of moderate contrast intended primarily for use in photographing cathode-ray screens of the green persistent type. We have found that an exposure of $\frac{1}{25}$ to $\frac{1}{10}$ of a second, using a $\times 20$ eye-piece and a $\times 25$ objective, is satisfactory. Using a $\times 20$ eye-piece and a $\times 40$ objective an exposure of $\frac{1}{10}$ to $\frac{1}{5}$ is satisfactory. Other types of apparatus may well

succeed with a shorter or longer exposure. The film is developed for 7½ minutes in Kodak D 19 (1:1), and contact prints may be made by using Kodak Velox F 5. If enlargements are necessary, F 4 Kodabromide is used.

Finger nail bed. This is first cleansed with xylene, dried, and cleared with yellow cedar oil which must be thick in consistency to give a smooth film. In order that a representative sample of the nail bed capillaries could be studied, a final magnification was adopted which allowed us to cover 25 to 30 loops in a single exposure. This area, it was felt, was likely to encompass most significant variations of morphology in the nail bed network. This was approximately the total field obtained by Callander in his work published in 1925 (3).

Magnifications and grid scales employed. The apparatus, having available two eye-pieces of ×10 and ×20 magnification coupled with several objective magnifications, enables a wide range of final magnifications to be obtained. We found that a combination of the ×20 eye-piece and the #25 objective gave a suitable "Standard Survey Magnification". From this negative we made 35 mm. contact prints that were adequate for inclusion with each patient's medical records and for enlargements that were either used to complete mosaic photomicrographs (Plate 2, nos. 354, 92) or accurately analyzable records for research purposes (Plates 3, 4, 5, 6). Both the contact prints and the research records had a superimposed grid scale which recorded distances of 0.1 and 0.01 mm., thus making it possible to compute exact magnifications. An "Extra Survey Magnification" using an eye-piece of ×20 and a #40 objective was frequently employed in cases of morphological interest (Plate 6, no. 345). This required an exposure of 1/10 to 1/5 of a second. Any capillary deviations can be objectively recorded on this higher magnification and in much greater detail. This magnification is also ideal for mosaic photomicrography and was used to compile the partial nail bed networks already mentioned.

Control subjects. The subjects whose nail bed capillaries were studied in this manner consisted of 20 R.C.A.F. aircrew, 42 student nurses, 65 athletes participating in the British Empire Games, 179 university students, and 109 R.C.A.F. groundcrew. Of the total of 415 in the group, 131 were females ranging in age from 15 to 50 years, and 284 males ranging from 15 to 50 years of age. All were in good health at the time of the survey.

Observations

Ten basic morphological capillary loop patterns were encountered in our analysis. A brief description of each pattern will be given. However, mention should first be made of the concept of "afferent" and "efferent" limbs. These small vessels have two main limbs in which a distinct flow of red cells, and sometimes white cells, can be seen. These two limbs are not of the same thickness. The direction of flow is from the thinner, the arterial component, to the thicker, the venous. However, on occasions it is possible to see, momentarily, a reverse flow taking place. We term that limb which carries its contents towards the tip of the loop the "afferent" and that which returns from the tip to the deeper vessels the "efferent". The mode of distribution of these small vessels from the sub-papillary plexus is clearly seen, along with the variation in the two limbs in Plate 2, no. 354.

The ten basic patterns encountered

Pattern A (Plate 3) Number 92. This is represented by those capillaries that have no warpings or indentations of either the afferent or the efferent limb, no twisting of either limb about itself or its opposite component, and no excessive distention of either the afferent or the efferent limb, or the tip of the loop.

Pattern B (Plate 3) Number 343. This is represented by those capillaries that show a certain amount of warping or indentation of one or both limbs. No twisting of one limb around the other or itself is evident.

Pattern C (Plate 3) Number 172. This is represented by those capillaries that show a single crossing in their passage to and from the sub-papillary plexus of deeper vessels. They may also show some warping or indentation, but the single twist is the prime consideration in classification.

Pattern D (Plate 4) Number 357. This is represented by those capillary loops whose limbs show more than one twist about each

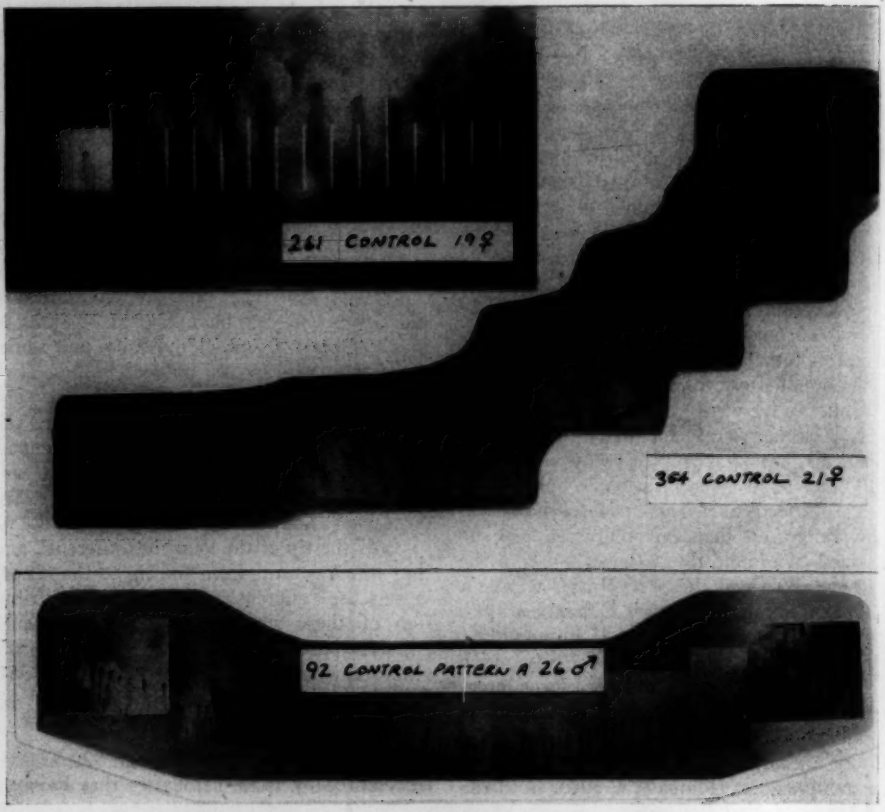


PLATE 2

other. They may, in addition, show some warpings, indentations or excessive distention.

Pattern E (Plate 4) Number 137. This is represented by those vessels in which the main feature is an obscure twisting of one limb upon itself. This may be seen in either or both of the arms. Sometimes a certain amount of twisting similar to the type seen in Pattern C is evident also.

Pattern F (Plate 4) Number 238. This is represented by those capillaries with an anomalous morphology at the tip of the loop. The general picture resembles the head of a femur in outline. This anomalous morphology usually extends into the efferent limb.

Pattern G (Plate 5) Number 414. This is represented by those capillaries that do not clearly spring from the deeper sub-papillary plexus. They appear to represent an immature horizontal network of vessels.

Pattern H (Plate 5) Number 193. This is represented by capillaries that resemble flowery shapes with many diverse twistings. They are usually indistinct in outline, presenting a typical blurred appearance.

Pattern I (Plate 5) Number 338. This pattern is represented by an extreme modification of Pattern B. The loops present a meandering course as they pass from the afferent to the efferent limb. A horizontal plexus is sometimes plainly visible.

Pattern J (Plate 6) Number 411. This pattern is represented by very short, thin vessels.

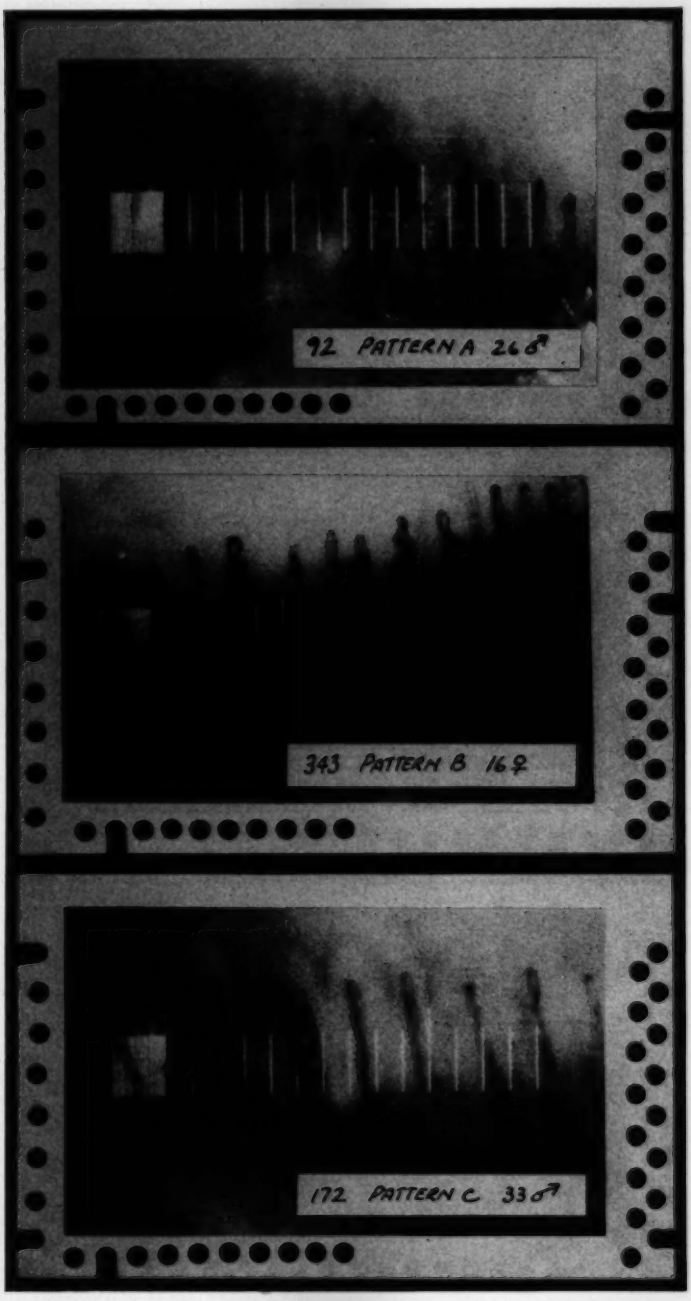


PLATE 3

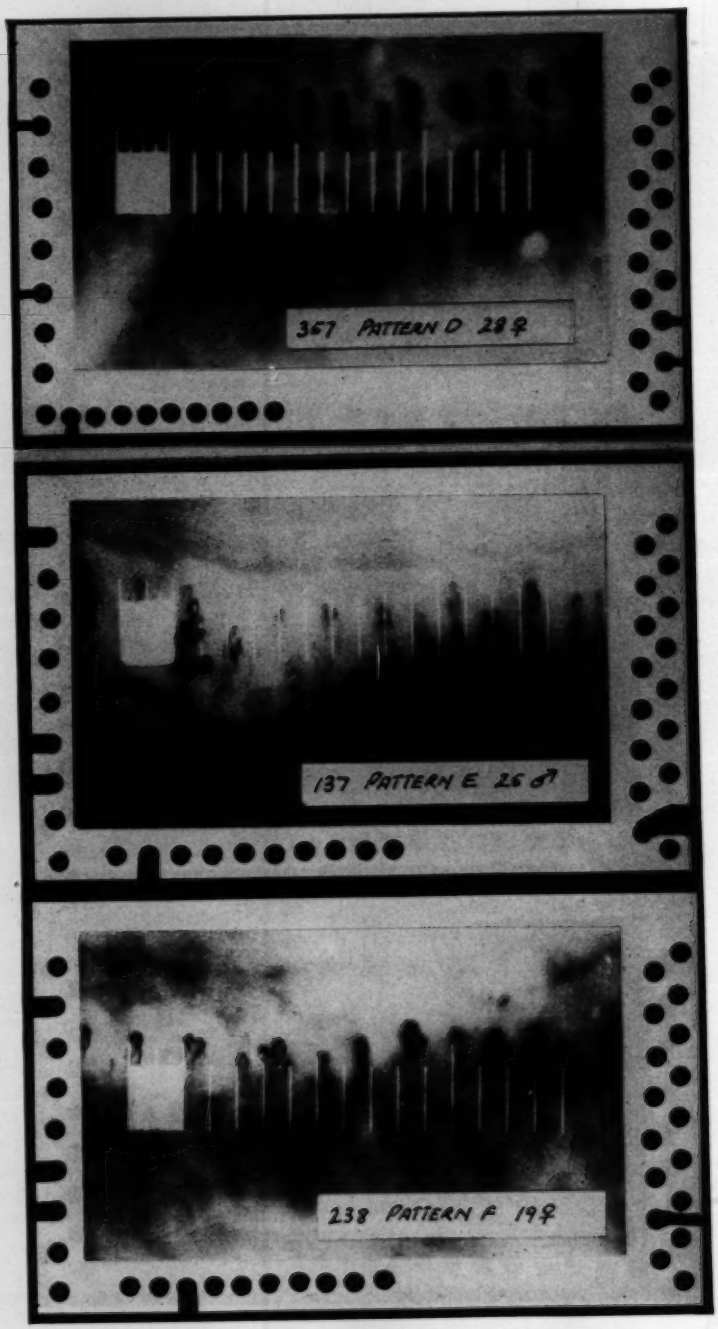


PLATE 4

PLATE 5

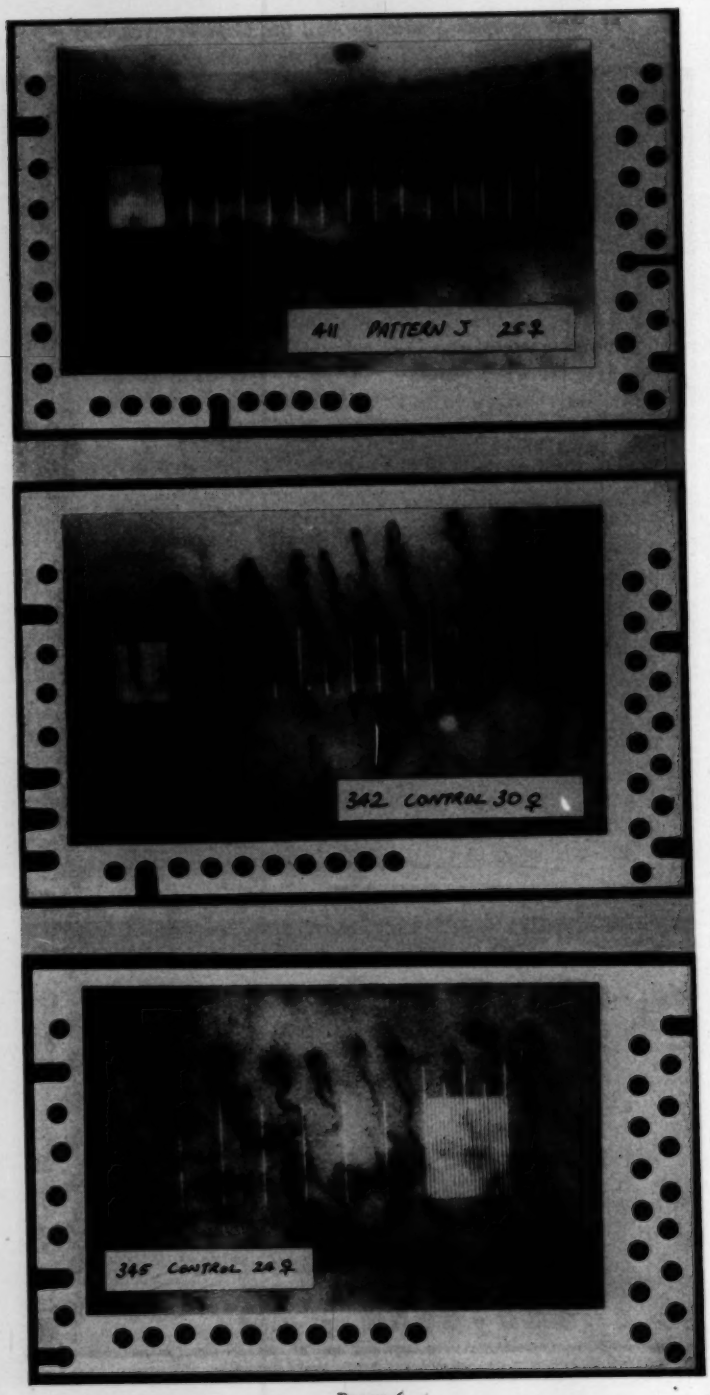


PLATE 6

Analysis of Results

Using the foregoing criteria the occupational groups already mentioned were kept separate throughout the entire classification process. A further subdivision was made between male and female subjects within each occupational group. Using the photomicrographs obtained from each person, every individual capillary in the proximal row of the nail bed network that was in focus was counted and placed in one of the ten basic pattern groups. In the majority of cases one could see at least ten capillaries accurately in focus. Sometimes it was possible to see as many as thirty loops; in rare cases not more than five were *clearly* visible. Thus 4,906 loops were counted and classified in 415 subjects. Loops that were not in focus were not counted. The percentage distribution of every pattern within each occupational group was then calculated. The results of this analysis are given graphically and represent the small clear blocks on figure 1. The percentage of pattern A loops occurring in the male group as a whole is represented by the black background on which are superimposed the occupational group percentages for the same pattern. This is repeated for the other nine capillary patterns studied. A further analysis was made of the relative distribution of open loops, closed loops and loops designated as "other" (figure 3). In this respect patterns A and B were considered open, C and D closed, and the remainder were termed "other".

An attempt has been made also to establish the density or frequency of occurrence of these capillary loops over a known distance for the proximal row of capillaries in the nail bed. This type of analysis is complicated by the fact that each nail bed contains more than one pattern in the field chosen for classification. Sometimes as many as six morphological variations confront the analyst. It was for this reason that our initial classification system, based on the predominant pattern occurring in the nail bed of each individual subject, did not permit an accurate statistical analysis. A certain amount of difficulty is encountered due to the problem of surface curvature with respect to each subject's finger. This is directly linked with the ability to obtain a satisfactory depth of focus on every subject. Consequently, in this density analysis, all those photomicrographs that rendered the whole field in reasonable focus were used. Occasionally field totals fall below 10 and sometimes they are over 30. However, in this control survey we have not noticed any below five or above 40 per 2 mm. field. Using a Standard Survey Magnification the mean number of loops per 2 mm. field was thus found to be 22 with a standard deviation of 3.3.

The raw data on which we base our results are given in figure 2. In the squares in which there are two sets of figures, the top set represents a percentage. The lower set represents the figure upon which this percentage was based. The respective ages have already been given earlier in the paper, and as far as we have been able to determine age had no influence on the morphology, within the limits of our own control group. With respect to those subjects, particularly from the Tropics, that have a dark pigmentation to their skins, it was not possible to obtain very clear photomicrographs with the methods employed in this survey.

In addition to the morphological variations already mentioned it should be stated that it is possible to demonstrate a pericapillary phenomenon which, for want of a better term, we have called the "halo" space. It occurs, in the majority of fields, as a translucent space with its contour closely following that of the loop itself and resembling the flame of a burning candle (Plate 2, no. 261). It usually has a constant spread from the loops in each individual field, but a few cases may show one capillary with a larger halo spread than those in the remainder of the field. Within the halo space, in some subjects, it is possible to demonstrate the presence of even smaller structures, closely allied to one of the capillary limbs in question. These structures may not be vessels, however (13, 40, 41) (Plate 2, no. 354).

One other aspect is the frequent occurrence of one capillary that is distinctly out of harmony with the rest of the field (Plate 6, no. 342). This capillary is usually the largest in the field. An Extra Survey Magnification photomicrograph is given to illustrate that it is possible, in cases of morphological interest, to sacrifice a large field total in preference for

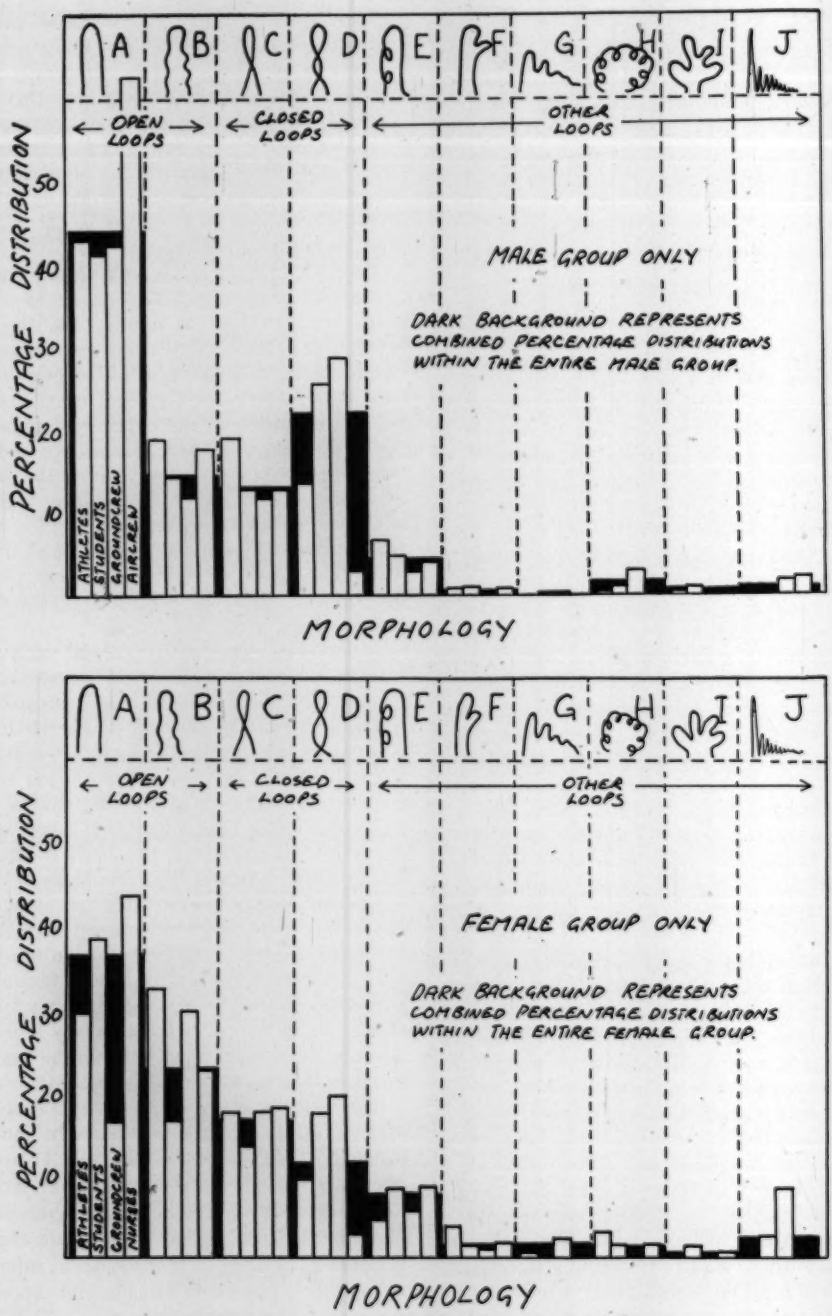

A
B
C
D
E
F
G
H
I
J
OPEN LOOPS
CLOSED LOOPS
OTHER LOOPS
PERCENTAGE DISTRIBUTION
50
40
30
20
10
MALE GROUP ONLY
DARK BACKGROUND REPRESENTS COMBINED PERCENTAGE DISTRIBUTIONS WITHIN THE ENTIRE MALE GROUP.
ATHLETES
STUDENTS
GROUNDCREW
AIRCREW
MORPHOLOGY
A
B
C
D
E
F
G
H
I
J
OPEN LOOPS
CLOSED LOOPS
OTHER LOOPS
PERCENTAGE DISTRIBUTION
50
40
30
20
10
FEMALE GROUP ONLY
DARK BACKGROUND REPRESENTS COMBINED PERCENTAGE DISTRIBUTIONS WITHIN THE ENTIRE FEMALE GROUP.
ATHLETES
STUDENTS
GROUNDCREW
NURSES
MORPHOLOGY

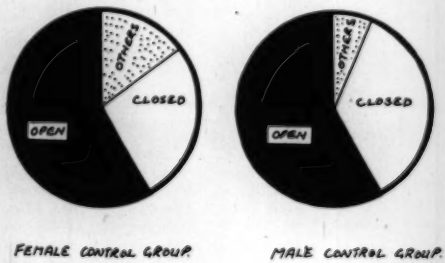
FIG. 1

RAW DATA WITH RESPECT TO 4906 INDIVIDUAL CAPILLARY LOOPS COUNTED ON 415 SUBJECTS PHOTOMICROGRAPHS.

INDIVIDUAL SUB-GROUPS	SEX	NUMBER	A	B	C	D	E	F	G	H	I	J	TOTAL	OPEN LOOPS	CLOSED LOOPS	"OTHER" LOOPS
AIRCREW	♂	20	62·3 232	17·4 65	12·3 46	2·4 9	3·8 14	0·3 1	0 0	0 0	0 0	1·6 6	373	74·8 279	14·7 55	5·6 21
GROUNDCREW	♂	91	42·1 446	11·8 130	11·5 127	28·1 311	2·2 24	0 0	0·1 1	2·8 31	0 0	1·4 16	1106	53·4 576	39·6 438	6·5 72
GROUNDCREW	♀	18	16·1 32	29·6 59	17·6 36	19·1 38	5·5 11	1·0 2	2·5 5	0 0	0 0	8·5 17	199	46·7 91	36·7 73	17·6 35
NURSES	♀	42	43·8 238	22·3 121	18·0 98	2·8 15	8·8 48	1·7 9	0 0	1·8 10	0·7 4	0 0	543	66·1 359	20·8 113	13·1 71
ATHLETES	♀	20	29·3 58	32·3 64	17·7 35	9·1 18	4·6 9	3·5 7	0·5 1	3·0 6	0 0	0 0	198	66·6 132	26·8 53	14·8 23
ATHLETES	♂	45	42·7 215	18·5 93	18·8 95	13·1 66	6·2 31	0·4 2	0 0	0·2 1	0·2 1	0 0	504	61·1 308	31·9 161	6·9 35
STUDENTS	♂	128	41·0 584	14·0 200	12·6 179	25·5 363	4·6 66	0·4 6	0·1 1	1·0 14	0·8 11	0 0	1424	55·0 784	38·0 542	6·9 98
STUDENTS	♀	51	39·3 214	16·3 91	13·6 76	17·2 96	8·2 46	1·1 6	0 0	1·6 9	1·1 6	2·7 15	559	50·6 305	30·8 172	14·1 82
TOTAL	♂♀	415	41·6 2039	16·8 823	14·1 691	18·7 916	5·1 249	0·7 33	0·2 8	1·4 71	0·4 22	1·1 54	4906	56·3 2862	32·5 1407	8·9 437
TOTAL	♀	131	36·2 542	22·3 335	16·3 244	11·1 167	7·6 114	1·6 24	0·4 6	1·7 25	0·7 10	2·1 32	1499	58·3 877	27·6 411	14·0 211
TOTAL	♂	284	43·9 1497	14·3 488	13·1 447	22·0 749	4·0 135	0·3 9	0·1 2	1·4 46	0·4 12	0·6 22	3407	58·3 1985	36·1 1196	6·6 226
MEAN PERCENTAGE			39·4	20·3	15·3	14·7	5·5	1·1	0·4	1·3	0·4	1·8				

FIG. 2

RELATIVE PERCENTAGE DISTRIBUTIONS OF THE THREE MAIN TYPES OF LOOP.



FEMALE CONTROL GROUP. MALE CONTROL GROUP.

FIG. 3

a much smaller one where there is increased detail available, with regard to single capillaries (Plate 6, no. 345).

DISCUSSION

Reference to the relevant literature will show that there has been designated a characteristic "normal" pattern for the nail bed capillary network consisting of straight forward hairpin loops, deviations from which constitute relative "abnormalities" (4, 5, 6, 24, 26, 27, 29, 32, 33, 34, 38, 42). Other authors have come to the conclusion that it is difficult to establish a characteristic normal pattern due to the many wide variations presented in any morphological analysis of a control group. They feel that the normal picture may present a wide variety of capillary shapes other than the straight forward hairpin loop (1, 3, 7, 8, 10, 11, 12, 14, 15, 16, 17, 19, 20, 21, 25, 26, 27, 28, 30, 31, 35, 36, 37, 40).

Some classifications of these small vessels have been based on the concept of relative degrees of maturity (34), the final and most mature stage representing the "normal" morphological picture as in our pattern A. Pathological patterns have been considered to represent an arrest in this developmental pattern. Certain authors feel that, "It is important to stress that at the end of normal development no horizontal network or subpapillary plexus can longer be seen" (20). Consequently they base their own classifica-

tions on the presence or absence of the subpapillary plexus and a horizontal network of vessels, together or singly (20, 21).

If any attempt is to be made to draw valid conclusions from our results, for further research, it would be as well to point out that this is a descriptive survey taking into account a considerable cross section of people (415) who are not inmates of any mental or correctional institution. It can be seen that should a highly selected group be chosen as a control, representing both a high standard of intelligence and physical well being, as in our group of military pilots, a pattern distribution ratio is encountered which appears significant. The difference in sex alone is not sufficient grounds for such a wide variation in the respective pattern distribution ratios as is evident when one compares the pilots (all males) with the female groundcrew.

It may well be that future concepts of normalcy, on a morphological basis, will have to consider not one pattern only, but any one of, or perhaps all of A, B, C and D. The technique employed here, insofar as it enables an extensive length of capillary to be studied in detail, necessitates this more strict division of patterns. Were it possible to photograph only the tops of the loops for a short distance it is quite conceivable that no differentiation could be made in most cases between patterns A, B, C and D. *They could all be assigned to pattern A*. Account might be taken of excessive distention of the respective limbs of these small vessels in any further refinement of this classification system.

The adoption of the ten basic patterns has one serious limitation which should be explained. The results obtained from such an analysis give only an indication of capillary morphology on a total basis. They are not a direct indication of the morphology of a single nail bed in any subject.

It can be seen that in the total control group over 91 per cent of the capillaries were of patterns A, B, C or D. These then are perhaps representative of the so-called "Normal Nail Bed Capillary Morphology". Further analysis must await the results of parallel surveys on groups of clinical interest.

Summary

1) An apparatus, together with the necessary techniques to be employed, enabling the morphology of the nail bed capillary network in human subjects to be objectively recorded by means of photomicrography, is described in detail.

2) A critical analysis of over 400 control subjects chosen from aircrew, service personnel, nurses, athletes participating in the British Empire Games, and university students, is outlined; attention is drawn to the frequent occurrence of certain discrete morphological patterns.

3) The results obtained are discussed in relation to previous research in this field, and to objective means of analyzing the patterns which may be encountered in studies upon mental and other patients.

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THE HISTOPATHOLOGY OF A CASE OF ENCEPHALITIS PERIAXIALIS CONCENTRICA

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Introduction

Balo in 1928 (1) described the histopathological changes in a case of encephalitis periaxialis concentrica. His case was characterized by concentric foci of varying size containing alternating layers of grey and white. These foci were located in the white matter of the right cerebral hemisphere. In these foci the medullary sheaths were degenerated, but the axis cylinders remained intact. In these concentric foci the degenerated layers alternated with relatively normal layers of white matter.

He noted that marked proliferation of the neuroglia followed the degeneration of the medullary sheaths. Giant glia cells were noted in some of these degenerated regions. There was also perivascular infiltration of the blood vessels with lymphocytes, plasma cells and compound granular cells in the regions where the degenerated medullary sheaths were noted. He suggested that these changes about the blood vessels indicated the inflammatory character of the process.

Hyaline changes in the arteries were noted in many regions, in the involved as well as in other regions of the brain. In the places where the medullary sheaths did not stain, numerous fat-filled compound granular cells were noted. The number of compound granular cells was smaller in the center than at the periphery of the foci. In this case no changes were noted in the cerebral cortex, basal ganglia, pons, medulla or cerebellum.

Benoit (3) described a case of concentric sclerosis in which there were large concentric foci of demyelination in the subcortical white matter of both cerebral hemispheres. These foci of demyelination resembled in all respects the lesions noted by Balo (1). He noted a small sharply-outlined focus of demyelination in the cerebellum, but did not illustrate this lesion, nor did he describe it in any great detail. The brain stem, medulla and spinal cord were normal.

In the demyelinated regions of the cerebral hemispheres Benoit noted a massive gliosis with fat-filled compound granular cells and a perivascular infiltration with many fat granule cells. He also noted some monster glial cells in these foci. In other parts of these foci, perivascular infiltration with lymphocytes and fat granule cells was seen.

Barre and Van Bogaert (2) described the changes in a similar case of encephalitis periaxialis concentrica. In their case the concentric foci of demyelination were noted in the frontal and parietal subcortical white matter of the cerebral hemispheres. However, no such lesions were noted in the neostriatum, paleostriatum, the nucleus of Luys, the brain stem or cerebellum. The cerebral cortex showed no noteworthy changes.

The axonal lesions in the concentric foci were less in degree than the myelin sheath degeneration. In the center of the foci, numerous giant glial cells and some fat granule cells were noted. These giant glial cells were gemästete astrocytes with multiple nuclei in some places. In the periphery of these concentric foci, accumulations of compound granular cells and hypertrophic macroglial cells were noted around the blood vessels. In the newer foci there were a large number of perivascular infiltrating lymphocytes. In the older foci there were perivascular infiltrations with fat granule cells. Hyaline change of the arteries and arterioles was seen. Barre and Van Bogaert, therefore, considered that Balo's disease was a demyelinizing disease with a particular aspect. They noted that in these concentric zones there is degeneration of the axones, with an accompanying proliferation of microglia and giant macroglia of the gemästete astrocyte type.

Hallevorden and Spatz (5) described two cases of concentric sclerosis, which were identical with the leucoencephalitis concentrica of Balo. In their cases the concentric foci were found in the subcortical white matter of the cerebral hemispheres. In these concentric

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foci the inner zones showed the changes of longest duration, while in the peripheral stripes of these lesions the changes were most recent. Hallevorden and Spatz considered that a lecitholytic ferment was the probable cause of these myelin sheath changes. In their second case an isolated small lesion was seen in the cerebellum, which resembled the lesions of multiple sclerosis.

Waggoner and Lowenberg (9) described the changes in a case of concentric sclerosis of the Balo type. They found concentric foci in the white matter of the left cerebral hemisphere. In addition, similar foci were noted in the basal ganglia, pons and in the medulla. Small foci of demyelination were seen in the insular cortex.

Zeman (10) also described the changes in a case of leucoencephalitis of the Balo type. He noted concentric foci of demyelination in the subcortical white matter of both cerebral hemispheres. He observed that the degree of axonal degeneration was less than that of the myelin sheath degeneration. In these foci many compound granular cells were seen, and fewer gemästete astrocytes were noted in the center of the foci.

In the concentric foci there were perivascular infiltrations of lymphocytes and plasma cells. In the region of the right midbrain peduncle there was a typical concentric focus of demyelination, similar to that noted in the cerebral hemisphere. Zeman considered that his case was comparable to the case of Hallevorden and Spatz (5).

Hecaen *et al.* (6) in 1950 also described a case of leucoencephalitis of the Balo type. They noted a number of concentric foci of demyelination in the subcortical white matter of the cerebral hemispheres. The corpus striatum, thalamus, red nucleus and the nucleus of Luys were normal. The cerebellum was normal. However, in the neighborhood of the hilum of the dentate nucleus small microscopic areas of perivascular degeneration were noted.

In the concentric areas of demyelination, giant forms of neuroglial cells were noted in some places. At the periphery of the concentric lesions the reaction of the fibrillary astrocytes was more intense. A marked perivascular infiltration with lymphocytes and plasma cells was seen in these foci. In fat preparations a rich deposit of lipids was seen in the white matter and near the blood vessels of the involved areas.

Report of a Case

B. B., Hospital No. 24926, aged 29, had been quite healthy until seven weeks before death, when she found that her left arm was numb. Five weeks before death she found that her vision in each eye was blurred, and four weeks before death it was noticed that she was losing interest in her affairs and that her eye sight was worse. Three weeks before death she fainted twice in the street, and after this she went to bed. Another attack of unconsciousness occurred at this time. Fourteen days before death she was admitted to the German Hospital. She refused all attention and investigation. While there a lumbar puncture showed a pressure of 135 mm., cells 1, total protein 150 mg.%, chlorides 750 mg.% and sugar 130 mg.%. She was admitted seven days before death to the National Hospital under the care of Dr. Purdon Martin. At that time she was agitated and frightened but with no speech difficulty.

Examination. Olfactory nerve function was normal. The optic discs appeared pale, and the veins were rather full. Her visual acuity was so diminished that she was unable to count fingers. The pupils were equal and dilated, only reacting slightly to light. Eye movements were normal, and the trigeminal, facial and hypoglossal cranial nerves were normal. No obvious motor weakness was noted. The left plantar response was extensor. The sensory system could not be tested.

Two days before she died, a ventriculography was carried out under a general anesthetic. This showed a small left lateral ventricle, but no displacement of midline structures. An attempt was then made through a right frontal burr hole to determine whether she had a cystic tumor in the right frontal lobe. During this time her respirations became very slow. On three occasions artificial respiration had to be administered. During these attacks her right pupil became dilated and reacted poorly to light. She remained unresponsive to verbal stimuli but responded to painful stimuli. Her pulse became weaker, and she died two days later on June 29, 1950.

Post-mortem examination: (Dr. W. Blackwood), 17 hours after death.

The serous sacs were all healthy. The lungs were congested and slightly edematous at their bases. The heart showed generalized and marked dilatation and moderate myocardial softening. The coronary vessels, endocardium and epicardium were healthy. The esophagus, stomach and intestines were healthy. The liver was of normal size, was diffusely pale and rather yellowish on section. The biliary and pancreatic organs were healthy. The thyroid, pituitary and suprarenal glands were healthy. The spleen showed only well-marked venous congestion with a slightly pale parenchyma. The pelves, ureters and bladder were healthy. Both ovaries were slightly enlarged and edematous. A hemorrhagic corpus luteum was found in the right ovary.

The brain showed bilateral cerebral swelling, with a slight bilateral temporal herniation. There was no shift of midline structures. On section at the time, deep within the white matter of each frontal lobe were patches of translucent, soft, clearly-defined abnormality. Within the substance of the larger patches were curving pale lines suggestive of residual myelin sheaths. On section after fixation, clearly-defined soft regions of demyelination, with a curvilinear outline and a somewhat concentric arrangement of both grey, translucent and thin white regions, were present in the deep white matter in both frontal lobes. The right frontal lobe was swollen. Plaques

FIG. 1. Section of the left parietal region; showing paraventricular demyelinated plaques; the larger plaque showing concentric lamination. Myelin stain.

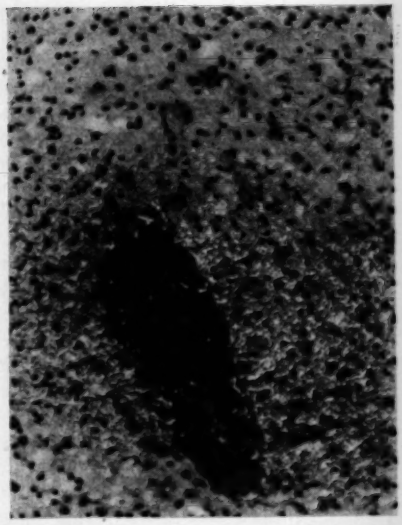

FIG. 2. Middle zone of the larger plaque shown in figure 1; showing marked perivascular infiltration with lymphocytes and plasma cells; as well as numerous compound fat granule cells and many large astrocytes. Hematoxylin, van Gieson stain. × 260.

were also present at the lateral angles of the lateral ventricles in their bodies and posterior horns. A specially large plaque was related to the vestibule of the left lateral ventricle.

The midbrain appeared healthy. No abnormality was noted in the brain stem. In the cerebellum there was a diffuse greyness of the posterior central white matter of each hemisphere; and on the right side in the cerebellar white matter three small peripherally-placed plaques were noted. The spinal cord was healthy.

Microscopical findings: Cerebrum.—Noteworthy changes were not seen in the cerebral cortex adjacent to the involved regions. There was no noticeable degree of loss of neurones. There was no evidence of mobilization of the neuroglia, and the myelinated fibers of the cerebral cortex seemed quite normal.

In the subcortical white matter of the left cerebral hemisphere two paraventricular lesions were noted, consisting of quite sharply-defined oval regions of massive demyelination. In these regions there was almost, but not quite, complete destruction of the axis cylinders. In the larger lesion there was a suggestion

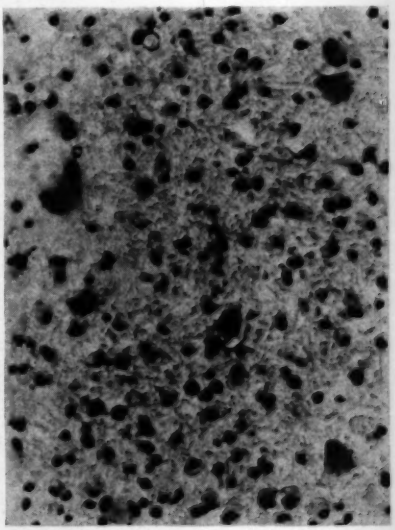

FIG. 3. Middle zone of plaque shown in figure 2, at a higher magnification; showing numerous compound fat granule cells and many large astrocytes. Hematoxylin, van Gieson stain. × 350.

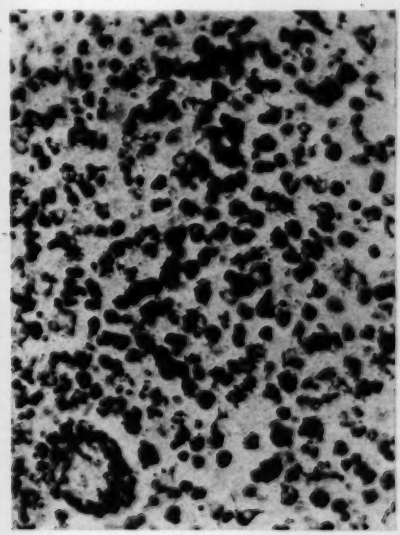

FIG. 4. Middle zone of plaque shown in figure 2; showing numerous fat-filled compound granular cells; and perivascular infiltration of a blood vessel with fat-filled compound granular cells. Scharlach R, hematoxylin stain. × 260.

of concentric lamination since a faintly-defined narrow semicircular zone of incomplete demyelination was visible midway between the center and periphery of the plaque (fig. 1). In this zone of incomplete demyelination, fragmented axis cylinders were seen, also short lengths of myelin sheaths, beaded, swollen and tortuous, but still retaining their affinity for hematoxylin. In Scharlach R preparations it was noted that the demyelinated areas were heavily infiltrated with compound granular corpuscles, packed with sudanophilic lipids (fig. 4).

The distribution of the fat-filled compound granular corpuscles was not uniform throughout the lesion. At the periphery of the lesion, and in the concentric bands of relative preservation of myelin sheaths, the fat-filled compound granular corpuscles were relatively few, were small, and tended to be elongated. Deep to this zone the fat granule cells were very numerous, well-rounded and filled with lipids (fig. 4).

The cerebral histiocytes or compound granular corpuscles were packed with lipid, some of which was anisotropic. In addition, numerous, elongated, slender, anisotropic crystalline structures were present, diffusely scattered throughout the plaques. These crystalline structures were morphologically similar to those commonly seen in the plaques of disseminated sclerosis. In such plaques Cumings (4) has shown that cholesterol esters are present.

In the demyelinated regions there was a marked degree of perivascular infiltration of many of the blood vessels, with lymphocytes and plasma cells and some fat granule cells. In Scharlach R preparations it was noted that the majority of the blood vessels had well-marked cuffs of mononucleated cells, consisting of both lymphocytes and compound granular corpuscles, filled with lipids, one of which type was usually much more numerous than the other (fig. 5). The lipids lying within the compound fat granule cells stained strongly with the sudanophilic stains, Scharlach R and Sudan Black. In sections stained with toluidin blue, no metachromasia was noted.

Throughout the demyelinated regions, but more marked towards their centers, there was a marked proliferation of astrocytes with

FIG. 5. Middle zone of plaque shown in preceding figure at a higher magnification; showing perivascular infiltration with many lymphocytes, plasma cells and some fat-filled compound granular cells; as well as numerous adjacent fat granule cells. Scharlach R, hematoxylin stain. × 480.

FIG. 6. Center of plaque shown in the previous figure; showing numerous large astrocytes and a smaller number of compound fat granule cells. Hematoxylin, van Gieson stain. × 600.

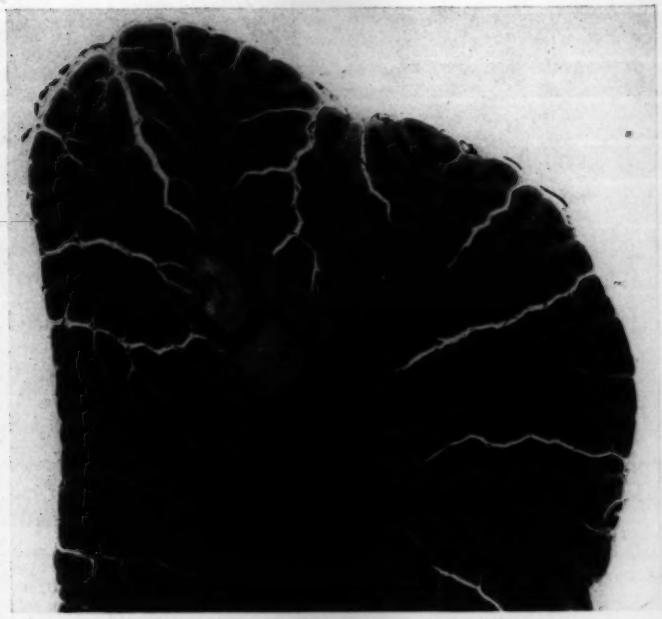

FIG. 7. Section of right cerebellar hemisphere showing four plaques of demyelination. Myelin stain.

commencing glial fiber formation. Many of the astrocytes were large and had swollen homogeneous cytoplasm. Some of the astrocytes contained two nuclei (fig. 5).

In the deepest part of the lesion there was undoubted glial fiber formation, and the astrocytes did not appear to be more numerous than in the intermediate zone of the lesion. However, they were more clearly visible because of the greatly diminished number of small mononuclear cells (fig. 6). At the edge of the demyelinated regions there was a narrow transitional zone in which partially-destroyed axis cylinders and myelin sheaths were seen to give way to apparently normal white matter. The arcuate fibers at the margins of the larger lesions were not involved.

Cerebellum.—At the levels examined there were four separate small plaques of demyelination in the deeper white matter. Two of these four plaques were larger than the others, and one of these had a finger-like process running up towards the folia (fig. 7). In this plaque there was a concentric zone of relatively greater preservation of axis cylinders compared to the rest of the plaque; and in this

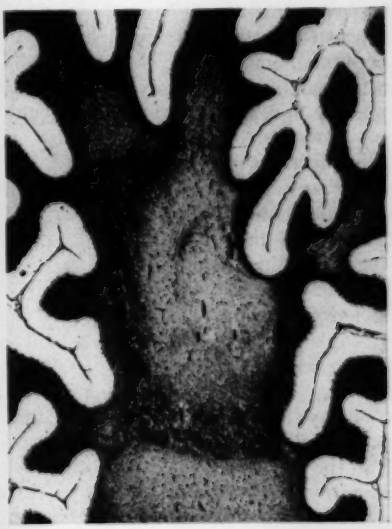

FIG. 8. Largest outer plaque of demyelination in right cerebellar hemisphere; showing concentric lamination. Gros-Bielschowsky for axones.

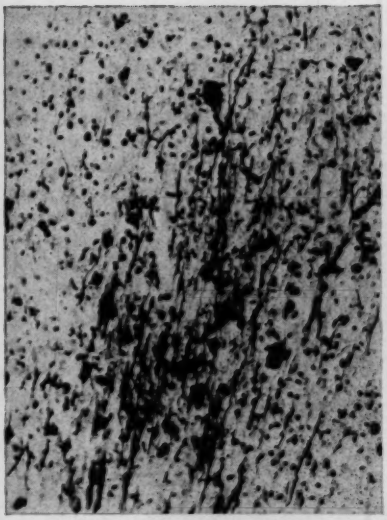

FIG. 9. Numerous surviving axis cylinders in large outer cerebellar concentric plaque. Gros-Bielschowsky for axones. × 260.

FIG. 10. Outer concentric cerebellar plaque of demyelination; showing marked perivascular infiltration with lymphocytes and plasma cells; as well as numerous astrocytes and compound granular cells in the adjacent area. Hematoxylin, van Gieson stain. × 260.

zone myelin sheaths were present, but they were not intact (fig. 8). They were replaced by fragments, many of which stained blue-black with the Loyez myelin stain.

The four plaques lay close together, and the intervening cerebellar tissue was not healthy. It contained fewer myelin sheaths and axones than normal. Some myelin sheaths and axones were fragmenting, and astrocytes were increased in number and size. The possibility that the four plaques were continuous with each other, at other levels, could not be excluded. These plaques were histologically earlier lesions than those noted in the left cerebral hemisphere. In all these plaques were more surviving axis cylinders than in the larger lesions in the left cerebral hemisphere. In Gros-Bielschowsky preparations there were many fragmented axis cylinders, and beading of the surviving axis cylinders was noted in many places (fig. 9). In the demyelinated regions were many fully formed compound granule cells, as well as many proliferating microglial cells in the "rod" cell stage. In addition, there were many large astrocytes throughout the affected regions. Many of the astrocytes had swollen homogeneous cytoplasm (fig. 11). At the periphery of the plaques of demyelina-

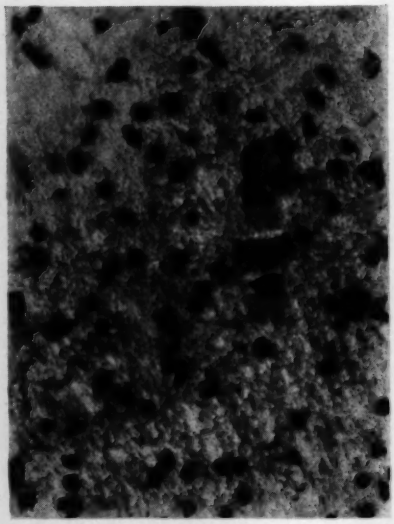

FIG. 11. The same cerebellar plaque of demyelination shown in the preceding figure at a higher magnification; showing numerous compound granular cells and a considerable number of astrocytes. Hematoxylin, van Gieson stain. × 500.

tion there was a transitional zone in which fragmented and beaded axis cylinders and partially-destroyed myelin sheaths gave way to relatively normal white matter.

A number of small blood vessels could be seen in the demyelinated regions of the cerebellum, with a marked degree of perivascular infiltration of these vessels with mainly lymphocytes, a few granular cells and a few plasma cells (fig. 10). The remainder of the central white matter of both cerebellar hemispheres was normal. The dentate nuclei showed no special changes. The cerebellar cortex likewise was quite normal in appearance. Thus, the

FIG. 12. Transverse section of the rostral level of the pons; showing an area of demyelination on one side of the pons. Myelin stain.

FIG. 13. Area of demyelination in the pons shown in figure 12, at a higher magnification. Myelin stain. × 10

molecular and granular layers were relatively normal, and the Purkinje cells showed no special noteworthy changes.

Pons.—On one side of the pons at the level of its rostral extremity, there was a small region of early demyelination at the junction of the basilar and tegmental parts of the pons. In van Gieson preparations this lesion in the pons was seen to consist of closely-grouped foci of damage both to the transverse and longitudinal fibers of the pons. In myelin preparations it was noted that in this demyelinated region the loss of myelin was not uniform (fig. 12). There was a central region of almost complete myelin destruction and a broad peripheral zone of pale myelin, which stained faintly compared to unaffected regions (fig. 13). In addition and situated rather between these two zones, there was a curious appearance of the pre-existent fiber bundles. The central portion of the fiber bundle was more severely affected than the periphery so that the center was pale compared to the periphery.

In van Gieson preparations the central zone was thickly populated with glial nuclei (fig. 14). The nerve cells of the pontile nuclei in the affected region were not appreciably diminished in number, nor did they look unhealthy. At the periphery of the lesion distended myelin sheaths were noted. Within these distended sheaths swollen axones could sometimes be seen. The nuclear population was not greatly different from adjacent healthy looking fiber tracts. But there was an excess of slender

FIG. 14. Area of demyelination in the pons, shown in preceding figure. Hematoxylin, van Gieson stain. × 110.

elongated straight or slightly curved nuclei, almost certainly indicative of a reaction on the part of the microglia. Definite fat granule cells were not seen.

Astrocytic nuclei were increased in numbers in the lesion. Small, round, darkly-staining nuclei, presumably those of oligodendroglia, were present in moderate numbers (fig. 15). The appearances were indicative of early demyelinating lesions. There was a well-

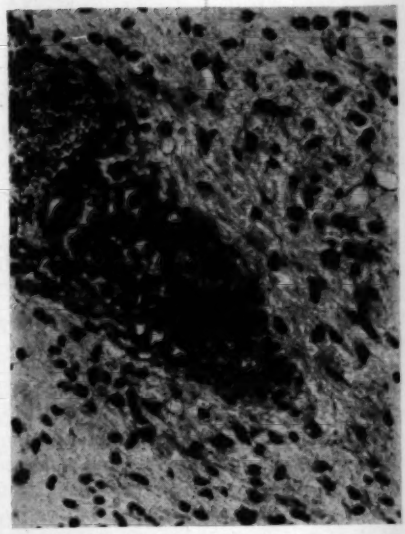

FIG. 15. Area of demyelination in the pons, shown in figure 14, at a higher magnification; showing marked perivascular infiltration with many lymphocytes and a few plasma cells, and in the adjacent area numerous astrocytes and reacting microglial cells. Hematoxylin, van Gieson stain. × 400.

marked perivascular infiltration with lymphocytes and occasional plasma cells in the lesion in the pons.

Medulla.—No special changes were noted in the medulla.

Spinal cord.—No noteworthy pathological changes were observed in the spinal cord.

Diseased blood vessels were not seen anywhere in the central nervous system. There was nothing to suggest that the areas of demyelination were related to individual blood vessels or vascular territories.

Chemical results: The normal white matter, the grey matter, and the demyelinated white matter of the brain of this case were examined by Dr. J. N. Cumings. The technique employed in this chemical investigation was the same as that used in a similar investigation in disseminated sclerosis and amaurotic family idiocy by Dr. Cumings in 1953. The results of this chemical examination are listed in table 1.

These findings show a loss of phospholipids in the demyelinated areas and also the presence of quite a considerable amount of cholesterol esters. The cortex is normal, and the normal white matter shows a slight reduction in phospholipids.

TABLE 1

	Normal White Matter	Demyelinated White Matter	Grey Matter
Total phospholipid	5.31	2.5	3.44
Mono-amino phospholipid	2.35	1.17	2.03
Sphingomyelin	2.96	1.33	1.41
Lecithin	1.73	0.35	0.87
Cephalin	0.62	0.82	1.16
Cholesterol—Total	3.03	2.34	1.17
Cholesterol—Free	3.0	1.44	1.17
Cerebroside	4.62	1.2	1.84
Water	72.2	82.2	78.6

Results in gm/100 gm. wet tissue.

DISCUSSION

A woman, aged 29, first noted numbness of left arm seven weeks before her death. Two weeks later she noted blurring of vision in both eyes, which became more marked a week later. Three weeks before her death she had several brief episodes of unconsciousness. The cerebrospinal fluid two weeks before her death revealed a pressure of 135 mm., cells 1 per cu. ml., total protein of 150 mg.%, chlorides 750 mg.%, and sugar of 130 mg.%. She had no speech difficulty.

Neurological examination at the National Hospital five days before her death revealed the following: The olfactory nerve function was normal. The optic discs were pale, and the veins were rather full. Her visual acuity was so diminished that she was unable to count her fingers. The pupils were equal and dilated and only reacted slightly to light. The other cranial nerves were normal. No obvious motor weakness was noted, and the left plantar response was extensor.

On post-mortem examination there were well-defined regions of demyelination, with a concentric arrangement of grey and white regions in these foci, in the deep white matter of both frontal lobes. The midbrain, brain stem and spinal cord appeared grossly normal. There were, however, in the cerebellum, on the right side, three small peripherally-placed plaques in the white matter.

In the larger lesions in the left cerebral hemisphere there was a suggestion of concentric lamination, and a faintly-defined zone of

incomplete demyelination was seen midway between the center and periphery of the lesion. In this area of incomplete demyelination, fragmented axis cylinders and short lengths of myelin sheaths were seen. With the exception of this zone, in the remainder of the lesion and in other foci of demyelination, there was almost but not quite complete destruction of the axis cylinders.

These demyelinated regions were markedly infiltrated with compound granular corpuscles packed with sudanophilic lipids. In the demyelinated regions there was also a marked degree of perivascular infiltration of many of the blood vessels with lymphocytes, plasma cells and some compound fat granule cells.

There was a marked proliferation of astrocytes in these demyelinated foci, which was more marked towards the center of the lesion. In the middle part of the demyelinated lesions were many compound fat granule cells as well as astrocytes. However, the number of compound fat granule cells was diminished or less towards the center of the foci.

The four plaques of demyelination in the cerebellum were, histologically, earlier lesions than those of the cerebral hemispheres. Thus, in all these cerebellar lesions there were more surviving axis cylinders than in the cerebral foci of demyelination. In these regions were many compound granule cells, many proliferating microglial cells and many large proliferating astrocytes. In one of the larger plaques was a somewhat concentric zone of relatively greater preservation of axis cylinders as compared to the rest of the plaque.

In the demyelinated regions of the cerebellum a number of small blood vessels could be seen, with a marked degree of perivascular infiltration with lymphocytes, plasma cells and a few compound granule cells.

On one side of the rostral level of the pons was a small region of early demyelination. No evidence of any degree of concentric lamination was seen in this focus of demyelination. The appearances were indicative of an early demyelinating lesion. In the case under discussion, no evidence of any hyaline change or other abnormality of the blood vessels was noted in the central nervous system.

In general the changes noted, in the foci of demyelination in the cerebral hemispheres of this case, resemble those noted by Balo (1), Benoit (3), Hallevorden and Spatz (5), Zeman (10), and others. However, in this case the degree of destruction of axones in the cerebral lesions was greater than that noted in the cases of Balo, Hallevorden and Spatz, Benoit, and Zeman.

However, in general, in the demyelinated foci in the cerebral hemispheres of this case, the degeneration of the myelin sheaths was relatively greater than that of the axis cylinders. This has been similarly noted by Balo, Hallevorden and Spatz, Barre and van Bogaert, and Zeman.

There was, in these cerebral lesions, marked proliferation of the neuroglia, associated with the degeneration of the medullary sheaths. A massive glial reaction consisting of many fat-filled compound granular cells and numerous proliferating large astrocytes was seen in the lesions. In addition marked perivascular infiltration with lymphocytes, plasma cells and some fat granule cells was noted. These changes resemble those described by Balo, Benoit, Hallevorden and Spatz, Barre and van Bogaert, and Zeman, in their cases of concentric sclerosis.

Waggoner and Lowenberg (9) described concentric foci in the brain stem and basal ganglia, in addition to those in the cerebral hemispheres, but none in the cerebellum. In this case no demyelinated foci were noted in the basal ganglia. There was, however, a small focus of early demyelination, not concentric in ontline, in the lateral part of one side of the pons.

In this case there were four cerebellar plaques of demyelination. One of the larger lesions showed a concentric zone of relatively greater preservation of the axis cylinders. These cerebellar foci contained many more surviving axis cylinders than the cerebral foci of demyelination, and were histologically earlier lesions than those in the cerebrum. However, one of the cerebellar lesions was of the same concentric type as those in the cerebral hemispheres. The cerebellar lesions were all, in general, quite similar histologically to the cerebral plaques.

Benoit and Hallevorden and Spatz noted small cerebellar demyelinated foci in their cases. However, these lesions were not of the

concentric type so that the presence of foci of demyelination of concentric type is a noteworthy feature of this case. No hyaline changes were noted in the vessels of the central nervous system in this case. This is in contrast to the situation in Balo's case, in which hyaline changes of the blood vessels were noted both in the normal and the affected regions of the brain.

The cerebral lesions would correspond to those noted by Balo, Benoit, Barre and Van Bogaert and others. However, in the cases described by Balo, Benoit, Hallevorden and Spatz, Zeman and others no such cerebellar concentric foci of demyelination have been noted. According to Dr. J. N. Cumings the findings of the chemical examination of the areas of the brain examined were very similar to those seen in other cases of multiple sclerosis and in the sudanophilic type of diffuse sclerosis, that he has previously examined.

Summary

1. The histological changes in a case of encephalitis periaxialis concentrica of the Balo type have been described.

2. The destruction of the medullary sheaths in the concentric foci is relatively greater than that of the axones.

3. Proliferation of the neuroglia (compound fat granule cells and large astrocytes) is associated with the destruction of the medullary sheaths.

4. Marked perivascular infiltration with lymphocytes, plasma cells and some compound fat granule cells was noted in the concentric demyelinated foci.

I should like to thank the Medical Committee of the National Hospital, Queen Square, and Sir Charles Symonds for permission to publish this case. I am indebted to Dr. W. Blackwood for the post-mortem findings and material; and to Dr. J. N. Cumings for the chemical findings of this case. I am grateful to the technical staff of the Histological Laboratory for their assistance; in particular to Mr. J. A. Mills for the photographs.

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THE EEG IN CEREBRAL ATROPHY[1]

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The most reliable and objective evidence of cerebral atrophy in the intact human being is that provided by the pneumoencephalogram (PEG), either showing ventricular dilatation, abnormal accumulation of air in the subarachnoid spaces, or both. Since electroencephalograms (EEGs) are often recorded in the course of the medical evaluation of patients with cerebral atrophy, the relationship between PEG and EEG findings in such cases is of interest. The literature in this area is comparatively small, and at this writing the data of some of the larger reported series of cases have not been presented in detail.

Bonnet *et al.* (2), Dell *et al.* (6), and Labauge *et al.* (10) have reported series of 130, 24, and 42 cases, respectively, but have not given quantitative breakdowns of their data. Sjaardema and Glaser (16) presented a number of cases in a paper on the localizing value of the EEG and PEG in epilepsy. Levin and Greenblatt (12) and Trowbridge and Finley (17) have reported series of 67 and 68 cases, respectively, and have given quantitative breakdowns of EEG data. The remainder of the literature consists of reports of one or a few cases reported separately or in connection with other topics (1, 3, 4, 5, 7, 8, 11, 13, 14, 18, 19); 25 cases in all have been reported in these 11 papers.

Different opinions have been expressed about such matters as locating areas of atrophy by EEG "signs" (e.g., amplitude asymmetry). It is the purpose of this paper to bring together the data reported in the papers just cited and an additional series of 25 cases from our files in an effort to arrive at some consensus. Our series will be reported first.

MATERIALS

Our materials consisted of clinical histories, PEGs, and 62 EEGs on 25 patients, 23 males and 2 females. The age range was 23 to 65, with two patients in the 3rd decade, 8 in the 4th, 3 in the 5th, 9 in the 6th, and 3 in the 7th. Seizures had been experienced by 12 of the patients. The mean ages of the seizure and the non-seizure groups were not significantly different.

In six cases only one EEG was recorded. In the other 19 from 2 to 7 EEGs were recorded: in 15 of these instances the repeat EEGs were consistent with the 1st recording, while in 4 there was a change in EEG picture. In one case the 1st EEG was abnormal diffuse slow (bursts of 4–5/sec. waves), and two later EEGs showed only mild diffuse fast activity; this patient had occasional seizures. In another seizure case the 1st EEG showed focal spikes and the 2nd EEG was normal. In the 3rd case the 1st two EEGs showed prominent diffuse fast activity, and the 3rd (one week after PEG) showed diffuse delta bursts. In the last case, the 1st EEG showed diffuse slow background activity and a prominent right occipital slow wave focus; the subsequent EEG showed only the diffuse slow background. The reasons for the change in EEG pattern in the last two cases are not evident. In the following exposition of results these 4 cases have been classified according to the most abnormal EEG seen, namely, abnormal diffuse slow, abnormal focal spikes, abnormal diffuse slow, and abnormal focal slow, respectively.

RESULTS

In 13 of the 25 cases the PEG revealed only ventricular dilatation, in only one was subarachnoid air alone seen, and in 10 both. There was one case of a large porencephalic opening between the subarachnoid space and the left lateral ventricle; this case has been classified with the ventricular dilatation group for statistical purposes. In 11 cases the atrophy was rated as slight, and in 14 cases as moderate or marked. In no case was there ventricular shift or other evidence of space-occupying lesion.

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In 18 cases (72%) the EEGs were abnormal. More than one EEG was recorded on 6 of the 7 cases with normal EEGs. Abnormality was considered "minimal" in only one case; in the others it was moderate or marked. Abnormalities fell into three categories: diffuse slow (9 cases), focal slow (6 cases), and focal spikes (3 cases).

Relationship between EEG and PEG findings. EEG findings in cases of slight and moderate-plus-marked atrophy as judged from the PEGs are shown in table 1. It will be seen that there is a tendency for abnormal EEGs to be associated with more severe atrophy. However, for this series the tendency is not statistically significant (Chi-square test, Fisher's exact method).

There was no relationship between EEG foci and focal atrophy as shown in the PEGs. Six PEGs showed focal atrophy (including the porencephaly). The EEGs were normal in two cases, abnormal diffuse slow in two, and in two (including the porencephaly) located the atrophic area correctly by slow wave foci. The other 7 cases with focal EEGs (4 with focal slow waves and 3 with focal spikes) were ones in which the PEGs showed diffuse atrophy.

TABLE 1

EEG	PEG Changes	
	Slight	Moderate + Marked
Normal	5	2
Abnormal	6	12
Total	11	14

TABLE 2

EEG	Seizures	No Seizures
Normal	1	6
Abnormal	11	7
Diffuse slow	6	3
Focal slow	3	3
Focal spikes	2	1
Total	12	13

TABLE 3

	PEG Changes	
	Slight	Moderate + Marked
Seizures	4	8
No seizures	7	6
Total	11	14

Relationship between EEG and PEG findings and occurrence of seizures. EEG findings in cases with and without seizures are shown in table 2. There is a significant positive relationship between presence of seizures and EEG abnormality in this series ($P = .046$). There is only a slight tendency (not statistically significant) for seizures to be associated with severe as contrasted with mild atrophy (table 3). There is no evident relationship in these data between distribution of EEG abnormality or distribution of atrophy and the occurrence or nature of seizures.

Discussion of the Literature

Over-all abnormality rates. Our abnormality rate for 25 cases was 72%. Levin and Greenblatt (12) obtained a rate of 54% in 67 cases using Gibb's criteria of EEG abnormality. Trowbridge and Finley's data (17) yield a rate of 53% abnormal and 33% borderline EEGs in 36 cases; these include EEGs described as "choppy", "rapid", and "mixed". Bonnet *et al.* (2) found 83% abnormality in 130 cases; this figure includes cases with "flat" EEGs described as being "at the limit of normality". Sjaardema and Glaser (16) found only 3.8% normal EEGs in the group of epileptics they studied, but not all of their cases involved atrophy. Abnormal EEGs were also found in 8 of 12 (75%) singly reported cases (the remaining 13 singly reported cases are excluded here because insufficient information was given to determine whether the EEG records were normal or not).

Although the data are not always clear, it appears that EEGs are more often than not abnormal in patients whose PEGs show extensive loss of cerebral tissue.

Kinds of EEG abnormality. In our 25 cases 60% had slow EEGs (36% diffuse and 24% focal) and 12% had focal spikes. No other abnormalities were seen. Among Levin and Greenblatt's 67 cases, 31% had slow EEGs (S1 and S2), 12% mixed (S1-F1), 9% fast (F1), and 1% spike-and-wave (PM). Among Trowbridge and Finley's 36 cases, 42% had

slow EEGs, 14% "rapid", 14% "choppy", 11% "mixed", and 3% spike-and-wave. Bonnet *et al.* did not give comparative figures but reported four kinds of abnormality: slow delta; slow sub-alpha; rapid, irregular, including spikes and sharp waves; and flat tracings. In the individual cases (1, 5, 7, 8, 11) a variety of abnormalities were reported: 2 focal slow, 1 focal slow+spike-and-wave, 2 focal spikes, 1 focal flattening, 1 diffuse slow, and 1 diffuse spike-and-wave. Alpha asymmetry and focal alpha flattening have also been cited as characteristic of atrophic brains (2, 4, 11, 13, 14); these features will be discussed in the following section.

It is evident that every type of EEG abnormality may be seen in atrophy cases with diffuse or focal slow waves being the most common. No abnormal sign peculiarly associated with atrophic disorders has been identified.

EEG localization. Although not all previous reports discuss the matter of localization by focal EEG abnormalities (slow waves or spikes), several cases of successful localization have been reported (1, 5, 8, 15). Bonnet *et al.* reported that correspondence between clinical findings, PEG, and EEG is frequent (75%) in cases of localized atrophy. We have not been so successful in this regard. In 6 cases with lateralized PEG changes 2 had normal EEGs, 2 diffuse slow abnormalities, and 2 focal slow EEGs, which correctly located the lesion. On the other hand, we had 4 other cases with focal slow EEGs and 3 cases with focal spikes, all with generalized PEG changes. Similarly, Levin and Greenblatt had 5 cases with focal EEG abnormalities, of which 3 had equal dilatation of the ventricles and 2 unequal, and in both of the latter the dilatation was greater on the side with less EEG abnormality.

From these data we cannot feel confident that EEG foci are valid indicators of the area of greatest loss of tissue in cases of cerebral atrophy.[3] In this regard it must be remembered that EEG abnormalities are indicators of functional disturbances, which are not necessarily maximal at the point of greatest structural damage, where there may be few neurons remaining to produce brain-wave activity of any kind. The PEG and EEG are not measures of the same phenomena although the changes they reveal may often be attributed to the same causal process. As others (2) have pointed out, the information from the PEG and the EEG are usually *complementary*.

Since the area of greatest structural damage may contain few, if any, functioning neurons, it would seem that electrical silence ("flattening" of EEG tracings), if seen, might localize such areas. Diffuse or bifrontal flattening of normal (alpha) activity, however, cannot confidently be attributed to atrophy since such patterns are common among normals. Neither can mild to moderate alpha asymmetry between the hemispheres be so attributed, for the same reason. Rubin (14) presented several cases of atrophy (not all with PEG control) in which the per cent-time-alpha gradient curves for the two hemispheres were dissimilar. However, the area of dissimilarity of the alpha-gradient curves often did not correspond to the distribution of tissue loss. Sjaardema and Glaser were unable to verify Rubin's observations. Earlier, Lemere (11) had reported 3 cases of cortical atrophy (PEG examination was not mentioned in his report) in 2 of which the alpha rhythm was depressed on the side of atrophy. Levin and Greenblatt found that asymmetrical EEGs were as common in cases with bilaterally equal ventricular dilatation as in cases with unequal dilatation. Our data failed to lend support to the use of alpha asymmetry in lateralizing atrophy. In only 4 of our 25 cases was the alpha more than slightly asymmetrical, twice in otherwise normal EEGs and twice in focal slow EEGs. In the latter the side of low-voltage alpha activity was the side of the slow focus. In all 4 cases the PEG showed generalized structural changes.

Labauge *et al.* (10) emphasized the value of sleep records in evaluating atrophy, based on their observations of 42 cases. They point out 3 types of asymmetry data which they believe aid in localizing atrophy: (a) flattening of sedative-induced fast activity, (b) unilateral flattening of normal sleep waves, and (c) unilateral flattening of waves evoked by sensory stimulation. Unfortunately they give no numerical data.

[3] As a point in differentiation it should be noted that slow wave foci in atrophy cases cannot be distinguished by EEG from similar foci associated with brain tumors (15). Most of our cases with slow foci were initially brain tumor suspects.

Focal suppression of EEG activity (that is, flattening confined to a circumscribed area of one hemisphere) has also been cited as an indicator of the area of atrophy. Delay *et al.* (4) mention one case of focal alpha flattening corresponding to the area of atrophy. Friedlander (9) reported on 271 cases with focal depression of voltage in the EEG. He concluded that there is a suggestion of a correlation between the side of demonstrable focal pathology and focal decrease in amplitude, but this is not great. He further concluded that there is no good correlation between type of pathology and the occurrence of focal depression. In view of the size of Friedlander's sample this is weak support, if support at all, for focal flattening as a localizing sign.

While asymmetry and focal flattening should not be disregarded in evaluating EEGs, such features are likely to be of little or no significance unless the depression of activity is (a) marked and (b) consistently observed throughout a record, or preferably more than one record. It has been our general clinical experience that marked focal flattening of background activity is most often associated with focal EEG disturbances of other kinds, usually slow waves. Friedlander's observations appear to support these conclusions.

The EEG and the degree and nature of structural change. In our data there was a slight, but not statistically significant, positive relationship between amount of tissue loss as shown by the PEG and the rate of EEG abnormality (table 1). Levin and Greenblatt have made a similar observation. They found 67% abnormal EEGs among their cases showing marked ventricular dilatation, 50% among those showing moderate dilatation, 33% among those showing slight dilatation, 57% among those with marked cortical atrophy, and 30% for those with slight to moderate cortical atrophy. Bonnet *et al.* state that EEG signs are less proportional to the intensity of atrophy than to its gravity and "evolutivity". Here again it would seem that the EEG and the PEG are complementary measures.

Levin and Greenblatt report 62% abnormal EEGs among 37 cases with ventricular dilatation (with or without associated cortical atrophy) as against 43% among 30 cases with cortical atrophy only. The difference is not statistically significant (our calculations). Sjaardema and Glaser found identical EEG abnormality rates (53%) in a similar comparison.

TABLE 4

EEG	Seizures	No Seizures
Normal	0	31
Abnormal	15	21
Total	15	52

EEG abnormality and occurrence of seizures. Our data show a statistically significant relationship between occurrence of seizures and EEG abnormality (table 2). Data from Levin and Greenblatt (table 4) show a similar relationship, also statistically significant ($P = .00002$; our calculations). Among the individual case reports are 8 cases with seizures (1, 5, 7, 8, 18). Seven of these had abnormal EEGs, 4 with spike or spike-and-wave activity. There was no case with paroxysmal EEG activity without seizures. Levin and Greenblatt's only case with spike-and-wave activity had seizures. In the whole literature, including our data, there are only two reported cases of cerebral atrophy with seizures but normal EEGs, and only one case with seizure discharges in the EEG but without seizures.

It can be concluded that in cases of cerebral atrophy with seizures, normal EEGs are rare.

Summary and Conclusions

EEG data on 25 cases with cerebral atrophy as shown by PEG have been presented and related to pneumoencephalographic and clinical findings. The results were compared with the findings of other workers reported in the literature. The following conclusions were drawn.

1. The EEG is more often than not abnormal in patients whose PEGs show cerebral atrophy. There is a rough relationship between presence of EEG abnormality and the degree of structural change. All kinds of EEG abnormalities are observed in such cases, with slow activity being the most common.

2. The EEG does not provide valid indica-

tion of the location or distribution of structural changes as revealed by the PEG.

3. There is a definite relationship between the presence of EEG abnormality and the occurrence of seizures. Seizure discharges, however, occur in only a minority of such cases.

4. There is no EEG feature pathognomonic of cerebral atrophy.

5. The PEG and the EEG are not necessarily indicators of the same pathological phenomena, but provide complementary information.

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RELATIONSHIP OF PSYCHOSIS AND PSYCHOSOMATIC DISEASE

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In recent years the literature has reflected the development of a concept that there is an inverse relationship between psychosis and somatic disease, especially those diseases such as peptic ulcer, ulcerative colitis, and allergic disorders, which are usually grouped among the psychosomatic disturbances. This presumed inverse relationship is described as having several aspects, namely: 1. psychosomatic disease is less prevalent in psychotic patients; 2. if a psychosomatic disease is eliminated, psychosis may be precipitated in a psychologically unstable, disturbed individual, or an already existing psychosis may be intensified; 3. if psychosomatic disease develops in a psychotic patient, the psychosis will disappear.

These formulations can be illustrated by various quotations from the literature. Grinker and Robbins (8) state that "frequently certain emotional conflicts or psychological stresses disturb one or another organ most severely without reaction on the part of the whole organism. In certain conditions some therapeutic procedures reverse the physiological disturbance of a particular organ, and the patient becomes disoriented, confused, manic or depressed, or in some general state of disequilibrium of total behavior. In these cases the specific somatic disturbance as a focus of the disequilibrium has defended the total organism, and when this defense is removed, a generalized psychotic disaster ensues. As we shall see later, it often becomes dangerous, in view of this effect on the total organism, to reverse a particular somatic process. This can be exemplified in cases of rheumatoid arthritis treated with cortisone at the cost of a manic attack, or peptic ulcer treated psychologically resulting in a paranoid state." Menninger (18) observes that "Patients admitted to a clinic for nervous or psychotic conditions often give the history of having suffered from physical illnesses which cleared up as the mental illness developed. Furthermore, as a general thing, the physical health of psychiatric patients is far above the average." Swartz and Semrad (27) also conclude from a survey of the incidence of psychosomatic disorders in a psychotic population that "it may indeed be that psychosomatic disorders are in a sense a defense and protection against a psychotic break—that to a certain extent an either (psychosomatic)—or (psychic) mechanism may prevail . . . the impression is gained that psychosomatic and psychotic disorders are not only incompatible but that each is to a great extent mutually effective in excluding the other."

The question of the validity of this concept is of both practical and theoretical importance. On the practical side, it will induce a hesitation in the treatment of psychosomatic disorders by organic methods which may produce rapid improvement or cure, for fear that this will precipitate a psychosis. This attitude is exemplified in the statement by Grinker and Robbins quoted above and the caution expressed by Appel and Rosen (1) regarding "the use of such new drugs as cortisone and adrenocorticotrophic hormone (ACTH) when sudden changes in the physical manifestations may be replaced by grave emotional and psychologic upheavals." In our experience as consultants to a medical service we have seen this attitude expressed in various ways. For example, recently an internist on this service expressed apprehension about subjecting a severely neurotic patient with hyperthyroidism to thyroidectomy for fear that elimination of the somatic disease would precipitate a psychosis.

On the theoretical side, this concept implies the hypothesis that there exists within the individual some fixed quantum of disturbance which is "bound" either by somatic or mental illness. If this quantum is fixed by one, it is no longer available to cause disturbances in the other, and if the fixation is

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broken, such as by cure of the somatic disease, then the quantum is free and available for fixation in the other area. Fenichel (5) illustrates this hypothesis with his formulation that "a certain percentage of what are called organ neuroses actually are affect equivalents." His concept is that the unconscious disturbed affect is bound by and expresses itself through the psychosomatic symptom. Szaz (28) expresses the same viewpoint in a discussion of the effect of vagotomy in peptic ulcer patients, "That 'organic' illness may bind psychic energy is not a new concept . . . upon removal by vagotomy of the peptic ulcer, the energy bound by the illness may be released in a rather diffuse manner—comparable to free floating anxiety on an 'organ-level'—and may then result in a number of poorly organized and changing symptoms." Appel and Rosen postulate that "some psychosomatic phenomena may be a more physiologic expression of a total conflict in which the organ system (skeletal system, gastrointestinal tract, and cardio-vascular apparatus, etc.) is behaving in what we might regard as a malignant, disorganized, or 'psychotic' fashion." A variant of this same approach is found in Menninger (18) who considers this fixed quantum of disturbance to be the unconscious self-destructive instinctual drive within the individual.

A survey of the literature indicates that although the concept of an inverse relationship between psychosis and psychosomatic disease is put forward very frequently, the material on which it is based is not abundant. This point is made in a review of the literature by Swartz and Semrad (27), who themselves favor this concept of the inverse relationship. Furthermore, a number of the articles consist of isolated case reports of one or several patients, without the statistical data which would indicate whether the inverse relationship in these specific cases was frequent or rare, usual or exceptional (12, 16, 20, 26). On the other hand, the literature also contains a number of similar case reports, in which the psychosomatic illness was coincident with, and even intensified during the course of a psychosis (1, 11, 23).

Where statistical surveys are reported, the various papers are frequently contradictory, or else the statistical evidence itself is weak. The greatest number of statistical reports concern the relationship between allergy and psychosis. McAllister and Hecker (17) report a survey of 1,875 hospitalized neuropsychiatric patients and 757 non-psychotic controls. They conclude that there is a remarkably lower incidence of major allergy and of positive physical findings of allergic response to ragweed pollen in psychotic patients. Ross, Hay and McDowell (22), on the other hand, conclude from a study of 1,608 hospital psychotic patients that the incidence of bronchial asthma does not vary significantly from the population at large. They expressed doubt of the validity of McAllister and Hecker's conclusions, stating that statistical analysis of the latter's data actually indicated that asthma is not significantly more frequent among the controls. Also, they point out that the differences in frequency regarding a history of allergy could be accounted for by difficulty in getting a history from the psychotics, and by sex differences between the psychotic and control groups. MacInnis (15) reports an incidence of only 5 cases of asthma in a survey of more than 7,000 patients in two mental hospitals. Three of the five cases gave no history of attack during the mental illness, but with remission showed definite manifestations of asthma. Leavitt (13) also found a low incidence of asthma, only 10 cases in a state hospital population of 11,547 patients. However, he states that "no evidence was found comparable to that of MacInnis where the bronchial asthma diminished in frequency or severity of attacks following the onset of a psychosis, and where the attacks resumed the pre-psychotic frequency and severity during a remission in the mental illness." Leigh and Lovett Daust (14) also conclude from an intensive study of 28 psychotic patients with bronchial asthma that "no intimate relationship was found between the psychosis and the asthmatic attack." It did not appear that psychosis replaced asthma or *vice versa*. They also conclude from a statistical study that, contrary to the reports of MacInnis and Leavitt, there is no significant difference in incidence of bronchial asthma in a group of psychotic

patients as compared to a group of healthy controls.

Sabath and Luce (24) report a series of 32 psychotic patients with asthma, in which the asthma co-existed with the psychosis in 19 patients, was antagonistic in time relationship in 11 cases, and appeared to be without definite relationship in the remaining 2 cases. In a number of the cases where the two co-existed an increase in the mental symptoms was accompanied by an increase in the severity of the asthma. They review the literature on the subject and conclude that "In the literature there is no consistent agreement about the relationship between asthma and psychosis."

With regard to the incidence of hypertension in psychosis, Miller (19) reports that a review of the literature shows "numerous contradictory reports of both high and low blood pressures in the various mental disorders."

In a recent article Honig (10) reviews the literature with regard to the relationship of peptic ulcer and psychosis. The reports are found to be contradictory, with some papers offering data to support the thesis of a reciprocal, inverse relationship, and others giving statistics indicating the lack of any such relationship. Honig then reports the results of a study of the combined incidence of peptic ulcer and psychosis at the Winter General Hospital from 1949 to 1953. In the autopsy material the figures suggest an absence of any significant difference between the incidence of peptic ulcer found at autopsy, whether of psychotic or non-psychotic patients. In the living psychotic patient population, he found a low incidence of the diagnosis of peptic ulcer, 2.8 per cent, as contrasted with the usual figures quoted for the general population (7 to 9 per cent). However, he feels that this discrepancy may be due primarily to the frequent difficulty in making the clinical diagnosis of peptic ulcer in psychotic patients, and cites several case histories to illustrate this point. Furthermore, he reviews the 22 cases in which both psychosis and ulcer were diagnosed. In 68 per cent the ulcer and psychosis were coexistent and concurrently active, while only in 16 per cent was there an alternation of the two disease processes. In the remaining cases the relationship could not be adequately evaluated.

Swartz and Semrad report a survey of 578 psychotic patients with a 3.4 per cent incidence of various psychosomatic disorders and 64 non-psychotic patients with a 4.5 per cent incidence of these disorders. Their conclusion is that "psychosomatic and psychotic disorders do not occur in the same person very frequently as clinical entities. It would appear that the psychotic individual does not very often use a psychosomatic disorder as a mechanism of defense." However, the difference of incidences of 3.4 per cent and 4.5 per cent in the two groups is certainly not impressive. Actually an increase of 5 cases in the psychotic group or a decrease of only 2 cases in the non-psychotic group would have made the incidence rate identical. Also, of the 20 cases in the psychotic group, only 10 showed any improvement or fluctuation of the psychosomatic symptom with the psychosis.

The reports in the literature on the relationship between other psychosomatic disorders and psychosis are quite scanty. There are several surveys indicating a very low incidence of arthritis among psychotic patients (7, 22). In the paper by Gregg reporting a low incidence of arthritis he raises the question, however, as to whether this phenomenon may not be due to other factors rather than any intrinsic antagonism between arthritis and psychosis. He suggests such factors as the placid, protected life, the good nutrition and dental care, the relative lack of exposure to infections, and the tendency of psychotic patients to complain less about their symptoms. Though he, himself, doubts the sufficiency of these factors, his own statistics tend to support the possibility that it is the institutional life and not the psychosis *per se* which protects the psychotic patient against arthritis. Specifically, he found the same low incidence of arthritis among mental defectives institutionalized for a long period at a state school as he did among the group of hospitalized psychotic patients.

These findings of Gregg raise the question as to whether the lower incidence reported in some papers for peptic ulcer among hospitalized patients may not have a similar explanation. The influence of environmental

stress and stress in precipitating and aggravating peptic ulcer is a well-known phenomenon. It certainly seems possible that insulation from such stress through chronic hospitalization could be a sufficient explanation for any lesser incidence of peptic ulcer or, for that matter, other psychosomatic disorders that may be found among hospitalized psychotic patients, without invoking any hypothesis regarding any intrinsic reciprocal antagonism. Furthermore, improvement of psychosomatic symptoms after hospitalization for psychosis or recurrence of the symptoms on discharge from the hospital after improvement of the psychosis, where this occurs, might also be related to the factor of environmental stress, its alleviation by hospitalization, and its recrudescence by actual or impending discharge from the hospital. It is also possible that the tension produced in a hospitalized psychosomatic patient where the improvement of the illness raises the issue of leaving the hospital and returning to a very unfavorable and emotionally disturbing environment might serve to precipitate a mental illness. As an example, Appel and Rosen (1) report three cases of inverse relationship of psychosis and psychosomatic illness to support the concept of intrinsic reciprocal antagonism. However, an examination of their case protocols reveals that in two of the three cases, one with rheumatoid arthritis, the other with ulcerative colitis, the psychosis developed in the hospital after improvement of the physical symptoms raised the question of the patients' going home. In both cases the history indicated marked disturbance and great tension revolving around the home situation.

As indicated above, the practical importance of the concept of the inverse relationship of psychosis and psychosomatic disease lies in the caution it imposes on the treatment of the latter, for fear that quick alleviation of the psychosomatic symptoms will produce a psychosis.

When we turn to the question of the possible danger that organic therapy, which leads to quick elimination of psychosomatic symptoms, may precipitate a psychosis, we find that the literature, though it contains many references to this possibility and to its occurrence in individual cases, does not bear out this contention. Browning and Houseworth (3) and Szaz (28) report psychiatric studies of a series of patients subjected to surgical procedure for the relief of peptic ulcer, gastrectomy in the one series and vagotomy in the other. In neither series did the improvement of the ulcer following surgery precipitate any cases of psychosis. The recent exhaustive work on peptic ulcer published under the auspices of the American Gastroenterological Association gives only the barest mention to the possibility of psychosis occurring after surgical treatment for peptic ulcer, listing it only in a routine enumeration of complications arising in all the body systems (24). Bram (2) reports a survey of over 5,000 cases of thyroidectomy for hyperthyroidism, in which only 20 cases of psychosis developed after the operation. Some of these cases developed years after the operation, presumably purely coincidentally. Goolker and Schein (6) report a psychiatric study of 80 patients treated with ACTH and cortisone for various organic illnesses. They state, "Fears have often been expressed that the sudden relief of a chronic illness, with its well entrenched secondary gains and homeostatic mechanisms may lead to dire psychic results. For that reason, special attention was paid to this relationship in those patients with marked changes. . . . In our series, the data did not suggest the above 'theoretical' predictions of psychic disaster as a general reaction to change." In their discussion they emphasize this point that "the removal or amelioration of chronic affect-later symptoms did not bring catastrophic accidents in their turn" and comment on the unexpected nature of this finding. In his discussion of their paper Lidz states that his own work leads him to confirm their observations of a lack of evidence "to bear out the frequently mentioned danger that symptomatic cure of a psychosomatic ailment is apt to precipitate a psychosis." Finally, Cannon *et al.* (4) in a report of the treatment of various chronic dermatoses of the pemphigus group with ACTH and cortisone report the absence of any important psychic reactions following improvement of the skin condition.

In a general article regarding goals of treat-

ment in psychosomatic medicine Rosenbaum, Reiser and Higgins (21) make the comment, "The concept that in certain instances a psychosomatic disorder and psychosis are interchangeable should be considered in setting therapeutic goals, but a rigid adherence to this concept as a generalization may act as a factor which limits therapeutic goals unnecessarily." They further state, "It has been emphasized that in some patients a psychosomatic disorder may operate as a defense against a latent psychosis. The actual frequency of such occurrences has not been established and has seldom been encountered in our experience." In a discussion of this article, Herman (9) affirms his agreement with this statement from his own clinical experience.

To summarize our review of the literature on the question of the inverse relationship between psychosis and psychosomatic disease, the above statement of Rosenbaum *et al.* is very apt. The literature is full of references to this concept. There are many individual cases and statistical studies offered as corroboration, but the actual frequency of such occurrences has not been established. The individual case reports of an inverse relationship can be matched by others in which there was a parallel relationship. Some of the statistical reports are not impressive, and others are contradicted by surveys which do not support this thesis of an inverse relationship. There is indication that insufficient attention is given to the possibility that the incidence of psychosomatic disorders in psychotic patients may be influenced by the environmental effects of long-term institutionalization. Finally, though there are many warnings regarding the danger of precipitating a psychosis in the treatment of psychosomatic illness, the evidence from the literature is that this is not a consistent phenomenon.

Our own clinical experience with this question of the relationship between psychosis and psychosomatic disease has involved primarily the contact with an extensive number of cases at Bellevue Hospital and secondarily from experience with a smaller group of patients in private practice. At Bellevue Hospital we have followed for the past six years those patients admitted or transferred from other hospitals in the city with a combination of somatic disease and psychosis. During the same period we followed a number of cases on the general wards of the hospital who were referred to us on a consultative basis with a combination of psychosomatic disease and emotional disturbance, though usually without frank psychosis. The combined total of these cases over this six year period is approximately 500, of which about 300 involved psychosomatic syndromes. In these patients we have observed all possible relationships: intensification of psychosomatic disease followed by psychosis; onset of psychosis followed by intensification of psychosomatic disease; fluctuation in one without effect on the other; inverse relationship of the psychosomatic disease and psychosis, but only in a very small number of cases. By far the most frequent relationship consisted of fluctuation in one entity without effect on the other. These cases involved practically all the possible combinations of the various psychosomatic syndromes with the major psychotic disturbances. In the hospital these patients, either spontaneously or as the result of treatment, showed improvement in either the psychosomatic or psychotic illness without a corresponding improvement in the other. Also, where relapse occurred in one entity, there was no increase in severity of the other illness.

Typical case illustrations of some of the possible relationships are as follows:

1. Intensification of psychosomatic disease followed by psychosis:

A 35-year-old man was transferred from another hospital with a history of generalized neurodermatitis for the past year. The dermatitis had gradually become more severe, and he was finally admitted to this other hospital several weeks previously. He became increasingly restless and noisy in the hospital, finally necessitating his transfer to Bellevue. On transfer he showed a diffuse, severe neurodermatitis with extensive excoriations from scratching. He was restless and irritable, with frequent noisy outbursts of discomfort and anguish. However, he was in good contact, and there was no evidence of overt psychosis. There was also no past history of psychosis. Psychodynamic material was very difficult to obtain because of the patient's complete preoccupation with his itching and pain. He was treated intensively with various dermatological measures calculated to reduce the itching but with no success. His condition remained essentially unchanged for about

a month when he suddenly developed a florid, typical paranoid schizophrenic psychosis, with hallucinations, delusions and ideas of references. Transfer to a state hospital became necessary. In this case the development and intensification of a severe psychosomatic disorder not only did not protect against a psychosis but seemed to operate to precipitate one. As far as we could determine the precipitating influence was of a nonspecific character, that is, the cumulative stress produced by a prolonged period of severe generalized pruritis and pain.

2. Development of a psychosis followed by intensification of a psychosomatic disease:

A 20-year-old male was transferred from another hospital with a diagnosis of ileocolitis and paranoid schizophrenia. He had an 8-year history of regional ileitis with many exacerbations and remissions, with eventual spread to involve the colon as well. He had had numerous hospitalizations elsewhere for the treatment of his intestinal disease. An ileocolostomy had been done 7 years ago, and a resection of the terminal ileum and ascending and transverse colon 2 years later without improvement. Due to this ineffectiveness of medical and surgical treatment, with recurrent episodes of fever, diarrhea, weight loss, anemia and tetany, a psychotherapeutic approach was finally recommended. His past history indicated a destructive family environment, with severe behavior disturbances on his own part prior to the onset of his illness. He was admitted to another mental hospital for intensive psychoanalytically oriented psychotherapy. This therapy involved to a large extent the confrontation of the patient with presumed latent homosexual drives and the vigorous pursuit of this theme in spite of his resistance and increasing anxiety. After 6 months he began to show increasing withdrawal and suspiciousness, and then developed overt paranoid ideas and ideas of reference concerning homosexuality. He felt that other patients were saying various things and making gestures to put him to the test and expose his homosexuality. He formulated an elaborate ideational system concerning the manner in which his action with several male and female patients would disguise his homosexuality. With the development of this psychotic reaction he also showed an exacerbation of his intestinal symptoms, necessitating a transfer to a general hospital for medical treatment. There he became more disturbed, increasingly suspicious and paranoid regarding the ward personnel, and he was transferred to Bellevue. On admission to Bellevue he was apathetic and withdrawn, but he could easily be stimulated to express his paranoid ideas. He was extremely ill physically, with irregular fever up to 102–103°, numerous watery bowel movements, anemia and tetany. For several weeks he continued to do very badly with the development of marked inanition, and appeared critically ill. He then improved slowly and after a few months was ambulatory. His intestinal disease was still mildly active, and his paranoid ideas, though they had receded into the background, could still be elicited. He was referred to the psychiatric clinic for supportive psychotherapy. In this patient it did seem as if a paranoid schizophrenic psychosis had been precipitated by injudicious use of psychotherapy. The outbreak of this psychosis not only did not ameliorate his somatic symptoms but was followed by their intensification to the point where his life was threatened.

3. Parallel course of psychosis and psychosomatic disease:

A 44-year-old energetic, restless and driving business man with a consuming ambition which compensated for a poverty in interpersonal relationships had five acute psychotic episodes in 20 years. Each episode was treated with electroshock with recovery. The last three episodes were accompanied by acute reactivation of a duodenal ulcer, which became quiescent each time as the psychosis improved.

Summary and Conclusion

Our survey of the literature and our own clinical experience do not support the prevalent concept of a direct, inverse relationship between psychosis and psychosomatic disease. On the contrary, it would seem that all possible relationships, and lack of relationship, can and do exist. Also, we question the validity of the psychodynamic formulation which is usually given for this concept of an inverse relationship. This psychodynamic formulation involves the hypothesis that a fixed quantitive amount of potential anxiety, of disturbed psychic energy, exists within the individual. This hypothetical quantum can then be "bound" and fixed either by a psychosis or a psychosomatic illness. If it is bound by one, it is unavailable for the other. If a psychosomatic disorder is cured quickly, then this anxiety will be freed and become free-floating with the possibility that it can disrupt the psychic equilibrium and precipitate the psychosis.

We would feel that this psychodynamic approach in terms of fixed quanta of anxiety is unproven and mechanistic. The weight of clinical evidence does not support it. It does not take into account the possibility that changes in the individual's physical or mental state or a concomitant change in his environment may generate new anxiety or cause an existing anxiety to disappear. For example, admission of a patient to a hospital because of the development of a mental or psychosomatic illness may remove him from an environment of stress and conflict, and so

diminish anxiety. On the other hand, impending or actual discharge from the hospital or imporvement of the illness may generate new anxiety if the patient is then faced with problems and conflicts which did not impinge on him as long as he was sick in the hospital. The onset or exacerbation of psychosomatic symptoms may represent a threatening experience to some individuals and so precipitate new anxiety.

We would feel that it is not possible to elaborate any simple mechanical psychodynamic formula which could explain the various kinds of interaction that occur between psychosomatic illness and psychosis. The interplay of dynamic forces is complex and variable from patient to patient, as shown by all the different types of relationships that occur between the two clinical entities.

We recommend that the concept of a simple, direct inverse relationship between psychosomatic disease and psychosis be abandoned. It is not validated by the clinical evidence; it is based on an unsound theoretical approach; and it imposes a brake on the active, vigorous treatment of psychosomatic conditions. In its place there is substituted an individualized approach, with the awareness that the important psychodynamic factors may be different in each patient. Treatment should be based on the evaluation of the specific etiological and dynamic factors which are uncovered in each individual case.

One psychiatric patient may react to a somatic disease as a threat with an increase in his mental disturbance. Another may find that such a physical illness serves to diminish other stresses, thus leading to improvement in his psychosis. Hospitalization may alleviate stress in one patient, increase it in another, and have a negligible impact on a third. The psychodynamic meaning of physical illness may vary qualitatively from one psychotic individual to another. Discharge from the hospital because of improvement of either mental or physical illness may be disturbing to some patients and may have the opposite effect on others.

No generalization can be made about the influence of these factors in any individual patient. Only the specific evaluation of the psychodynamic forces operating in each case will make it possible to evaluate correctly the relationship between a psychosis and psychosomatic disease.

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MENTAL DISEASE IN RELATION TO ECONOMIC STATUS

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There is a general impression that the distribution of mental diseases is related in part to the economic composition of the general population. There are several lines of evidence pointing to such a conclusion. This is associated with the evidence of an increasing incidence of physical diseases as one passes from the lowest income groups to those higher on the economic scale. There is a presumption that, if true of physical disorders, this must also be true of mental disorders. There is some supporting evidence showing that groups that are low in the occupational scale have higher rates of first admissions to hospitals for mental disease than some that rank higher (1). Additional support comes from the distribution of rates of first admissions in urban communities. Such studies show a rising trend, in general, as one passes from sections of a city that indicate low social status to those that include higher income groups (2).

It is impossible, however, to provide statistical evidence that is clearly indicative of a relation between economic status and the prevalence of mental disease. This requires a classification of both the general population and of admissions to mental hospitals in accordance with economic status. We do have such a classification in broad categories for the hospital population, but we lack a corresponding classification for the general population. In the absence of such a classification, it cannot be shown that the *rate* of first admissions to hospitals for mental disease is correlated with economic status. It is possible, however, to show qualitative differences among first admissions, when these are classified in economic groups (table 1). The economic categories are defined as follows:

Dependent. Lacking in the necessities of life or receiving aid from public funds or persons outside the immediate family.

Marginal. Living on earnings but accumulating little or nothing, being on the margin between self-support and dependency.

Comfortable. Having accumulated resources sufficient to maintain self and family for at least four months (3).

In applying these definitions to minor and aged people who are cared for by their families, they receive the same economic classification as the latter.

Statistics showing the distribution of first admissions according to economic status are almost always based upon admissions to state hospitals. Such statistics show that only about six per cent of first admissions were classified with the comfortable group during fiscal years 1939–1941 (4). This is clearly an underestimate for all first admissions since it excludes admissions to private mental hospitals. Obviously, patients admitted to such hospitals belong to a higher economic category. When they were added to the total, the percentage in the comfortable class rose to 12.3.

This is an important consideration when we contrast the economic status of first admissions with respect to race. Practically all Negro admissions are to state hospitals, whereas a substantial percentage of white first admissions of comfortable economic status is admitted to private hospitals. This source of error is avoided in the following comparison since we shall deal with first admissions to all mental hospitals in New York State, both public and private.

There were 3,908 Negro first admissions to all hospitals for mental disease in New York State during the three fiscal years ending June 30, 1941. Of this total 30.4 per cent were described as in dependent circumstances, 66.4 per cent in marginal circumstances, and only 1.2 per cent in comfortable circumstances. The high percentage classified as dependent and the low percentage classified as comfortable are striking. By themselves, however, they do not show whether these represent high or low rates of first admissions since we do not have the corresponding distribution of the general Negro population. It is common knowledge that Negroes belong to lower economic categories than whites. The census

TABLE 1.—First Admissions to All Hospitals for Mental Disease in New York State, 1939–1941, Classified According to Race and Economic Status

Economic Status	Negro				White			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	565	624	1,189	30.4	5,517	4,528	10,045	23.6
Marginal	1,499	1,096	2,595	66.4	13,630	11,345	24,975	58.7
Comfortable	27	20	47	1.2	2,440	3,217	5,657	13.3
Unascertained	35	42	77	2.0	568	1,318	1,886	4.4
Total	2,126	1,782	3,908	100.0	22,155	20,408	42,563	100.0

of 1940 showed, for example, that more than 50 per cent of male Negroes in the labor force were either service workers or laborers, compared with only 15 per cent of the male white labor force. Three-fourths of female Negroes in the labor force were either domestic or other service workers, compared with only 20 per cent of the white females (5). Obviously, therefore, the great majority of Negroes belongs (5) to the lower economic classes. This is not a sufficient basis, however, for computing corresponding rates of first admissions.

It can be shown, however, that the economic status of the Negro first admissions varies among the several groups of mental disorders (tables 2–8). If there were no such relation, the distribution according to economic status should be approximately the same. On the contrary, it appears that there are significant differences.

It was noted that 30.4 per cent of the Negro first admissions were in dependent economic circumstances. The percentage varied widely, however, among the numerically important groups of psychoses. Of those with psychoses with cerebral arteriosclerosis, 46.6 per cent were dependent. Of those with senile psychoses, 57.4 per cent were dependent. On the other hand, the manic-depressive psychoses included only 18.1 per cent classified as dependent. Because the economic distribution of Negroes is skewed so heavily toward the lower end of the scale, the percentage of first admissions classified as comfortable was low (1.2). It was especially low for first admissions with psychoses with cerebral arteriosclerosis and with senile psychoses. On the other hand, it was relatively high (8.1 per cent) for first admissions with involutional psychoses. There were no first admissions with manic-depressive psychoses classified as comfortable. This was contrary to the usual experience and may be due to an incorrect description of some who were placed in the marginal category. The low percentage for dementia praecox is characteristic, however, and is in accord with previous experience.

It is clear, therefore, that the distribution of the economic levels is not a random one but that certain groups, especially those associated with advanced age, are drawn disproportionately from low economic levels, and that others, like the involutional psychoses, are drawn from higher levels.

Because of the greater number involved, and a wider spread of the economic distribution, the statistics for the white population are more significant than those for Negroes. Of the 42,563 white first admissions to all hospitals for mental disease in New York State during the three fiscal years ending June 30, 1941, 23.6 per cent were dependent, 58.7 per cent marginal, and 13.3 per cent comfortable.

The percentage of dependency varied widely. It was highest among first admissions with psychoses with cerebral arteriosclerosis (54.9) and senile psychoses (40.7). It was lowest among first admissions with manic-depressive psychoses (9.8) and involutional psychoses (13.9). First admissions with dementia praecox belonged to a lower economic class than either of the two preceding groups, 20.0 per cent of such first admissions being classified as dependent. The percentages classified as comfortable varied in a reverse order. The highest percentages of the comfortable occurred among the manic-depressives (24.2). First admissions with involutional pyschoses were also above

TABLE 2.—First Admissions with General Paresis to all Hospitals for Mental Disease in New York State, 1939–1941, Classified according to Race and Economic Status

Economic Status	Negro				White			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	99	56	155	26.9	416	129	545	24.3
Marginal	311	87	398	69.0	1,128	349	1,477	65.9
Comfortable	5	3	8	1.4	121	39	160	7.1
Unascertained	10	6	16	2.8	34	24	58	2.6
Total	425	152	577	100.0	1,699	541	2,240	100.0

TABLE 3.—First Admissions with Alcoholic Psychoses to all Hospitals for Mental Disease in New York State, 1939–1941, Classified according to Race and Economic Status

Economic Status	Negro				White			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	70	34	104	23.6	367	102	469	17.4
Marginal	249	74	323	73.2	1,619	234	1,853	69.0
Comfortable	11	—	11	2.4	198	64	262	9.8
Unascertained	1	2	3	0.7	68	35	103	3.8
Total	331	110	441	100.0	2,252	435	2,687	100.0

TABLE 4.—First Admissions with Psychoses with Cerebral Arteriosclerosis to all Hospitals for Mental Disease in New York State, 1939–1941, Classified according to Race and Economic Status

Economic Status	Negro				White			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	121	163	284	46.6	1,469	2,776	4,245	54.9
Marginal	149	165	314	51.4	1,692	542	2,234	28.9
Comfortable	3	2	5	0.8	757	111	868	11.2
Unascertained	5	2	7	1.1	288	94	382	4.9
Total	278	332	610	100.0	4,206	3,523	7,729	100.0

TABLE 5.—First Admissions with Senile Psychoses to all Hospitals for Mental Disease in New York State, 1939–1941, Classified according to Race and Economic Status

Economic Status	Negro				White			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	45	63	108	57.4	824	1,027	1,851	40.7
Marginal	27	47	74	39.4	840	1,234	2,074	45.6
Comfortable	1	—	1	0.5	143	298	441	9.7
Unascertained	2	3	5	2.7	69	114	183	4.0
Total	75	113	188	100.0	1,876	2,673	4,549	100.0

TABLE 6.—First Admissions with Involutional Psychoses to all Hospitals for Mental Disease in New York State, 1939–1941, Classified according to Race and Economic Status

Economic Status	Negro				White			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	3	13	16	25.8	114	289	403	13.9
Marginal	6	34	40	64.5	545	1,248	1,793	61.7
Comfortable	—	5	5	8.1	188	405	593	20.4
Unascertained	—	1	1	1.6	21	97	118	4.1
Total	9	53	62	100.0	868	2,039	2,907	100.0

TABLE 7.—First Admissions with Manic-Depressive Psychoses to all Hospitals for Mental Disease in New York State, 1939–1941, Classified according to Race and Economic Status

Economic Status	Negro				White			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	9	14	23	18.1	126	207	333	9.8
Marginal	29	73	102	80.3	695	1,312	2,007	59.3
Comfortable	—	—	—	—	242	576	818	24.2
Unascertained	2	—	2	1.6	25	202	227	6.7
Total	40	87	127	100.0	1,088	2,297	3,385	100.0

TABLE 8.—First Admissions with Dementia Praecox to all Hospitals for Mental Disease in New York State, 1939–1941, Classified according to Race and Economic Status

Economic Status	Negro				White			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	112	161	273	23.9	1,101	917	2,018	20.0
Marginal	399	429	828	72.6	3,527	3,174	6,701	66.3
Comfortable	7	6	13	1.1	401	600	1,001	9.9
Unascertained	8	19	27	2.4	97	296	393	3.9
Total	526	615	1,141	100.0	5,126	4,987	10,113	100.0

the average percentage of the comfortable, with 20.4. Dementia praecox was below the average with 9.9 per cent, and approximated closely to the organic groups of mental disorders in this respect. There appears to be a distinct separation with respect to economic status on the part of first admissions with manic-depressive and involutional psychoses, on the one hand, and dementia praecox and the organic group of psychoses, on the other hand. The former were relatively more prevalent at the higher economic levels. The others, including dementia praecox, prevailed to a greater degree among the lower economic groups.

It is evident, then, that Negro first admissions, like Negroes in general, belong to a lower economic class than the corresponding white groups. In both populations, however, the dependent category appeared more frequently among first admissions with psychoses associated with old age and dementia praecox, and the comfortable category appeared more frequently among first admissions with involutional psychoses, and definitely among whites, among first admissions with manic-

depressive psychoses. It is therefore probable that there is some association of a qualitative nature between economic status and the relative distribution of the psychoses. Those of clearly organic origin appear disproportionately in the lower economic levels. Dementia praecox also appears disproportionately in this class. This may be, in part, a statistical artifact because of the age factor. Dementia praecox occurs at an early age, which limits the possibility of a subsequent rise in the economic scale. The manic-depressive psychoses, on the contrary, arise in part at a later age, after an opportunity for economic stabilization. In addition, however, there are group differences in personality which may be related to class structure. The influence of the economic factor is most apparent in the psychoses of old age. Economic difficulties and, perhaps, deprivation would be most difficult to support at this period of life and must increase the pressures which frequently result in the necessity for hospitalization.

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MENTAL DISEASE AMONG PUERTO RICANS IN NEW YORK CITY, 1949–1951

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There have been three important waves of migration to New York State since 1920. The first, following World War I, and accelerated by the depression during the 1930's, consisted of a large influx of Negroes from the South. The second wave began during the first half of the decade 1930–1940, and consisted in large part of refugees from Europe. The third wave represented migrants from Puerto Rico.

Migration from Puerto Rico began with a trickle (1). The census of 1910 reported only 1,513 persons in the United States who were of Puerto Rican birth. This number increased to 11,811 by 1920. Between 1920 and 1930 the number of those of Puerto Rican birth increased to 52,774. Despite the depression years, their number increased to 69,967 by 1940, an increase of 17,193, or 32.6 per cent, during the decade. After 1940, however, migration from Puerto Rico increased by great strides. The total of such migrants was 226,110 in 1950, an increase of 156,143 during the decade 1940–1950, or 223.2 per cent.

The outstanding characteristic of this migration is the fact that it was directed in recent years primarily to New York State (2). When first recorded in 1910, only 641, or 42.4 per cent of the total migrants of Puerto Rican birth, were in New York State. By 1940, however, the percentage had grown to 90.4. A more wide-spread distribution was indicated in 1950, but even in that year, 84.6 per cent of the total were in New York State.

The primary goal of this migration was New York City (2). In 1940, when there were 63,281 residents in New York State of Puerto Rican birth, 61,463, or 97.1 per cent, were in New York City. In 1950, the corresponding percentage was 98.0. If Puerto Rican migration is primarily a problem for New York State, it is clearly limited still further to New York City. The population of Puerto Rican birth in New York City increased from 61,463 in 1940 to 187,420 in 1950, but the growth since then has been even more remarkable. Using statistics of net migration from Puerto Rico, it has been estimated that those of Puerto Rican nativity totaled 355,000 in New York City in December, 1953, representing an annual rate of increase of 48,000 since December, 1950, compared with an annual rate of about 12,600 during the previous decade (3). Puerto Ricans, therefore, now constitute one of the largest segments of the population of New York City.

The problem is not merely one of number. Migration from Puerto Rico results primarily from a desire to escape the poverty of the island, and to find greater economic opportunities elsewhere. Because of their poverty, Puerto Ricans have been compelled to live in slum areas of New York City. Their low occupational status, complicated still further by the barrier of language, restricts them to a low standard of living. Many investigations have shown a direct relation between standards of living and conditions of health. It is therefore important, in view of their number and conditions of life, to study the problem of the prevalence of mental disease among migrants from Puerto Rico. Because of their concentration in New York City, the following investigation will be concerned with first admissions from New York City to all hospitals for mental disease in New York State.

Following the definition of the Bureau of the Census, we shall consider as Puerto Ricans those who were born in Puerto Rico or, if native-born, had parents one or both of whom were born in Puerto Rico. On this basis, there were 1,200 Puerto Rican first admissions to the New York civil state hospitals between October 1, 1948, and September 31, 1951, of whom 1,163 were from New York City, and only 37 from the remainder of the State. Of the former, 580 were males and 583 females. This is a smaller representation of females than might have been expected, in view of the fact that females represented 53.5 per cent of

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TABLE 1.—First Admissions from New York City to the Several Classes of Hospitals for Mental Disease in New York State, 1949–1951

	Of Puerto Rican Origin				Other			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Civil state hospitals	527	560	1,087	93.4	13,015	13,402	26,417	79.7
Hospitals for criminal insane	20	1	21	1.8	310	34	344	1.0
Federal hospitals	25	—	25	2.1	425	1	426	1.3
Private licensed hospitals	8	22	30	2.6	2,054	3,906	5,960	18.0
Total	580	583	1,163	100.0	15,804	17,343	33,147	100.0

TABLE 2.—First Admissions from New York City to all Mental Hospitals in New York State, 1949–1951, Classified According to Economic Status

Economic Status	Of Puerto Rican Origin				Other			
	Males	Females	Total		Males	Females	Total	
			Number	Per cent			Number	Per cent
Dependent	127	242	369	31.7	4,081	5,301	9,382	28.3
Marginal	420	294	714	61.4	9,497	8,499	17,996	54.3
Comfortable	22	35	57	4.9	1,807	3,016	4,823	14.6
Unascertained	11	12	23	2.0	419	527	946	2.9
Total	580	583	1,163	100.0	15,804	17,343	33,147	100.0

the total Puerto Rican population of New York City on April 1, 1950.

Because of the limited hospital facilities in Puerto Rico, it is not possible to make an effective comparison of rates of first admissions in Puerto Rico with those in New York State. It is significant, nevertheless, that the Insular Psychiatric Hospital in Puerto Rico reported only 160 first admissions during the year ending June 30, 1952, and 195 during the succeeding fiscal year (4). This may be contrasted with an annual average of 400 Puerto Rican first admissions in New York State during the three fiscal years 1949–1951.

Of the 1,163 Puerto Rican first admissions from New York City, 1,087, or 93.4 per cent, were admitted to the civil state hospitals; 25, or 2.1 per cent, to the mental hospitals administered by the federal government; and only 30, or 2.6 per cent, to the private licensed hospitals (table 1). A total of 21, or 1.8 per cent, were admitted to the two state hospitals for the criminal insane. In contrast, only 79.7 per cent of the first admissions among the remainder of the population of New York City were admitted to the civil state hospitals, but 18.0 per cent were admitted to the private hospitals. The difference is due primarily to the low economic status of Puerto Ricans. Of their total first admissions, 93.1 per cent were described as in either dependent or marginal economic circumstances, and only 4.9 per cent were comfortable. In contrast, 14.6 per cent of the non-Puerto Rican first admissions were in comfortable circumstances (table 2).

Of the 1,163 first admissions of Puerto Rican ancestry, more than half (58.0 per cent) were diagnosed as dementia praecox. No other group was of comparable numerical significance (table 3). Those with psychoses with cerebral arteriosclerosis or senile psychoses included only 7.6 per cent of the total first admissions. In contrast, dementia praecox included only 31.4 per cent of the first admissions among non-Puerto Ricans, whereas psychoses with cerebral arteriosclerosis and senile psychoses included 30.9 per cent (table 4).

The average annual rate of first admissions per 100,000 corresponding general population was 157.7 for the Puerto Ricans, compared with 144.5 for the non-Puerto Ricans. The

TABLE 3.—First Admissions from New York City to All Hospitals for Mental Disease in New York State, of Puerto Rican Nativity or Parentage, 1949–1951

Mental Disorders	Number			Per Cent			Average Annual Rate per 100,000 Population		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
General paresis	14	6	20	2.4	1.0	1.7	4.1	1.5	2.7
With other syphilis of central nervous system	7	1	8	1.2	0.2	0.7	2.0	0.3	1.1
With epidemic encephalitis	—	1	1	—	0.2	0.1	—	0.3	0.1
With other infectious diseases	4	2	6	0.7	0.3	0.5	1.2	0.5	0.8
Alcoholic	45	8	53	7.8	1.4	4.6	13.1	2.0	7.2
Due to drugs or other exogenous poisons	2	1	3	0.3	0.2	0.3	0.6	0.3	0.4
Traumatic	5	2	7	0.9	0.3	0.6	1.4	0.5	0.9
With cerebral arteriosclerosis	18	43	61	3.1	7.4	5.2	5.2	10.9	8.3
With other disturbances of circulation	—	2	2	—	0.3	0.2	—	0.5	0.3
With convulsive disorders	28	19	47	4.8	3.3	4.0	8.2	4.8	6.4
Senile	7	20	27	1.2	3.4	2.3	2.0	5.1	3.7
Involutional	11	35	46	1.9	6.0	4.0	3.2	8.9	6.2
Due to other metabolic, etc., diseases	1	3	4	0.2	0.5	0.3	0.3	0.8	0.5
Due to new growth	1	—	1	0.2	—	0.1	0.3	—	0.1
With organic changes of nervous system	2	5	7	0.3	0.9	0.6	0.6	1.3	0.9
Manic-depressive	1	17	18	0.2	2.9	1.5	0.3	4.3	2.4
Dementia praecox	360	314	674	62.1	53.9	58.0	105.0	79.5	91.4
Paranoia and paranoid conditions	1	1	2	0.2	0.2	0.2	0.3	0.3	0.3
With psychopathic personality	16	13	29	2.8	2.2	2.4	4.7	3.3	3.9
With mental deficiency	18	32	50	3.1	5.4	4.3	5.2	8.1	6.8
Psychoneuroses	18	31	49	3.1	5.3	4.2	5.2	7.9	6.6
Undiagnosed	5	4	9	0.9	0.7	0.8	1.4	1.0	1.2
Without psychosis	2	7	9	0.3	1.2	0.8	0.6	1.8	1.2
Primary behavior disorders	14	16	30	2.4	2.7	2.6	4.1	4.1	4.1
Total	580	583	1,163	100.0	100.0	100.0	169.1	147.7	157.7

average annual rates for males were 169.1 and 142.1, respectively. The rates for females did not differ significantly, being 147.7 for the Puerto Ricans and 146.8 for the non-Puerto Ricans.

The differences with respect to the distribution of the several groups of mental disorders and with respect to rates of first admissions were due, in large part, to the ages of the two populations. Those of Puerto Rican origin were relatively young. Half of the Puerto Ricans were under 25 years of age. Those of advanced age (65 or over) included only two per cent. The median age was 24.5 years. In contrast, the non-Puerto Ricans of New York City included only 34 per cent who were under 25 years of age, and included 8 per cent at ages 65 or over. Their median age was 34.4 years. Because they are weighted with a youthful population, the Puerto Ricans necessarily include a high percentege of mental disorders associated with youth, such as dementia praecox, and a low percentage with mental disorders associated with advanced age.

The relation of age to rates of first admissions is shown in table 5. Prior to age 35 there was an irregularity in the trend, but after 35 the average annual rates progressed rapidly to a maximum of 651.9 per 100,000 population at ages 75 or over. There was a similar trend among the non-Puerto Rican population from minima at the younger ages to maxima in old age (table 6). In general, however, those of Puerto Rican birth or ancestry had higher rates at all comparable ages.

The average "crude" rates per 100,000 corresponding population were 157.7 for the Puerto Ricans and 144.5 for the remainder of the population of New York City (table 7). These rates are affected, however, by the

TABLE 4.—First Admissions* from New York City to all Hospitals for Mental Disease in New York State, 1949–1951

Mental Disorders	Number			Per Cent			Average Annual Rate per 100,000 Population		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
General paresis	547	232	779	3.4	1.3	2.4	4.9	2.0	3.4
With other syphilis of central nervous system	71	54	125	0.5	0.3	0.4	0.6	0.4	0.5
With epidemic encephalitis	34	32	66	0.2	0.2	0.2	0.3	0.3	0.3
With other infectious diseases	47	27	74	0.3	0.2	0.2	0.4	0.2	0.3
Alcoholic	1,399	545	1,944	8.9	3.2	5.9	12.6	4.6	8.4
Due to drugs or other exogenous poisons	39	50	89	0.2	0.3	0.3	0.4	0.4	0.4
Traumatic	160	35	195	1.0	0.2	0.6	1.4	0.3	0.9
With cerebral arteriosclerosis	3,136	2,884	6,020	19.8	16.6	18.2	28.2	24.4	26.2
With other disturbances of circulation	52	73	125	0.3	0.4	0.4	0.4	0.6	0.5
With convulsive disorders	196	163	359	1.2	0.9	1.1	1.8	1.4	1.6
Senile	1,492	2,715	4,207	9.4	15.7	12.7	13.4	23.0	18.3
Involutional	986	2,122	3,108	6.2	12.2	9.4	8.9	18.0	13.5
Due to other metabolic, etc., diseases	67	94	161	0.4	0.5	0.4	0.6	0.8	0.7
Due to new growth	90	90	180	0.6	0.5	0.5	0.8	0.8	0.8
With organic changes of nervous system	152	98	250	1.0	0.6	0.8	1.4	0.8	1.1
Manic-depressive	430	870	1,300	2.7	5.0	3.9	3.9	7.4	5.7
Dementia praecox	5,058	5,350	10,408	32.0	30.8	31.4	45.4	45.3	45.4
Paranoia and paranoid conditions	65	77	142	0.4	0.4	0.4	0.6	0.7	0.6
With psychopathic personality	322	217	539	2.0	1.3	1.6	2.9	1.8	2.4
With mental deficiency	236	257	493	1.4	1.4	1.4	2.1	2.2	2.2
Psychoneuroses	660	1,000	1,660	4.2	5.8	5.0	5.9	8.4	7.2
Undiagnosed	122	72	194	0.8	0.4	0.6	1.1	0.6	0.9
Without psychosis	307	190	497	2.0	1.1	1.5	2.8	1.6	2.2
Primary behavior disorders	136	96	232	0.9	0.6	0.7	1.2	0.8	1.0
Total	15,804	17,343	33,147	100.0	100.0	100.0	142.1	146.8	144.5

* Exclusive of those of Puerto Rican nativity or parentage.

TABLE 5.—First Admissions from New York City of Puerto Rican Birth or Puerto Rican Parentage to All Hospitals for Mental Disease in New York State, 1949–1951, Classified According to Age

Age (Years)	Number			Per Cent			Average Annual Rate per 100,000 Population		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Under 5	—	—	—	—	—	—	—	—	—
5–9	5	2	7	0.9	0.3	0.6	14.7	5.8	10.2
10–14	20	32	52	3.4	5.4	4.4	64.9	99.5	82.6
15–19	72	95	167	12.4	16.3	14.4	244.0	249.7	247.2
20–24	124	84	208	21.4	14.4	17.9	311.7	163.9	228.5
25–34	169	139	308	29.1	23.8	26.5	247.2	169.8	205.0
35–44	80	92	172	13.8	15.8	14.8	153.7	158.9	156.4
45–54	63	57	120	10.9	9.8	10.3	218.4	188.1	202.9
55–64	28	35	63	4.8	6.0	5.4	282.4	242.1	258.4
65–69	7	18	25	1.2	3.1	2.1	295.4	304.6	301.9
70–74	5	14	19	0.9	2.4	1.6	490.2	515.7	508.7
75 or over	7	15	22	1.2	2.6	1.9	933.3	571.4	651.9
Total	580	583	1,163	100.0	100.0	100.0	169.1	147.7	157.7

TABLE 6.—First Admissions* from New York City to All Hospitals for Mental Disease in New York State, 1949–1951, Classified According to Age

Age (Years)	Number			Per Cent			Average Annual Rate per 100,000 Population		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Under 5	—	—	—	—	—	—	—	—	—
5–9	94	18	112	0.6	0.1	0.3	12.0	2.4	7.3
10–14	214	169	383	1.4	1.0	1.2	33.2	27.1	30.2
15–19	707	670	1,377	4.5	3.9	4.2	108.6	98.2	103.3
20–24	1,361	1,078	2,439	8.6	6.2	7.4	170.8	118.7	143.0
25–34	2,495	2,727	5,222	15.8	15.7	15.8	141.7	136.4	138.9
35–44	2,131	2,784	4,915	13.4	16.1	14.8	118.1	138.0	128.6
45–54	2,249	2,613	4,862	14.2	15.1	14.7	134.8	152.5	143.8
55–64	2,336	2,175	4,511	14.8	12.5	13.6	191.6	180.7	186.4
65–69	1,191	1,160	2,351	7.5	6.7	7.1	307.1	271.5	288.6
70–74	1,059	1,234	2,293	6.7	7.1	6.9	452.9	449.7	451.2
75 or over	1,967	2,715	4,682	12.4	15.6	14.1	980.4	981.3	980.9
Total	15,804	17,343	33,147	100.0	100.0	100.0	142.1	146.8	144.5

* Excluding those of Puerto Rican nativity or parentage.

TABLE 7.—Average Annual Rates of First Admissions from New York City to All Hospitals for Mental Disease in New York State, per 100,000 Corresponding Population, 1949–1951

Age (Years)	Average Annual Rates among Puerto Ricans (a)			Average Annual Rates among Remainder of Population of New York City (b)			Ratio of (a) to (b)		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
5–9	14.7	5.8	10.2	12.0	2.4	7.3	1.2	2.4	1.4
10–14	64.9	99.5	82.6	33.2	27.1	30.2	2.0	3.7	2.7
15–19	244.0	249.7	247.2	108.6	98.2	103.3	2.2	2.5	2.4
20–24	311.7	163.9	228.5	170.8	118.7	143.0	1.8	1.4	1.6
25–34	247.2	169.8	205.0	141.7	136.4	138.9	1.7	1.2	1.4
35–44	153.7	158.9	156.4	118.1	138.0	128.6	1.3	1.2	1.2
45–54	218.4	188.1	202.9	134.8	152.5	143.8	1.6	1.2	1.4
55–64	282.4	242.1	258.4	191.6	180.7	186.4	1.4	1.3	1.4
65–69	295.4	304.6	301.9	307.1	271.5	288.6	1.0	1.1	1.0
70–74	490.2	515.7	508.7	452.9	449.7	451.2	1.1	1.1	1.1
75 or over	933.3	571.4	651.9	980.4	981.3	980.9	0.9	0.6	0.7
Total	169.1	147.7	157.7	142.1	146.8	144.5	1.2	1.0	1.1

distribution of the general population with respect to age and sex. The Puerto Rican population was younger and had a higher percentage of females than the entire population of New York City. Each of these factors has a relatively favorable influence upon the rate of first admissions. Hence, it is necessary to compare the Puerto Ricans and the non-Puerto Ricans on the basis of a constant age and sex distribution. This was done by using as a standard the population of New York

TABLE 8.—Average Annual Standardized Rates of First Admissions from New York City to All Hospitals for Mental Disease in New York State, 1949–1951

	Of Puerto Rican Origin (a)	Other (b)	Ratio of (a) to (b)
Males	262.7	183.4	1.4
Females	214.5	180.7	1.2
Total	239.3	185.5	1.3

State on April 1, 1950, with the age and sex distributions as of that date. Those under 15 years of age were excluded.

On this basis, we find that Puerto Ricans had a standardized rate of first admissions of 239.3 per 100,000 population, compared with 185.5 for the non-Puerto Rican population (table 8). The excess was especially large among males, the rates being 262.7 and 183.4, respectively, or an excess of 43 per cent among Puerto Ricans. The standardized rate for the females of Puerto Rican origin (214.9) was in excess of that of non-Puerto Ricans (180.7) by 19 per cent. It is also of note that, whereas there was only a slight sex difference among non-Puerto Ricans, the standardized rate of male Puerto Ricans exceeded that of the females by 22 per cent.

Dementia Praecox

It was noted above that the only group of first admissions of numerical significance among the Puerto Ricans was dementia praecox (table 9). This group included 58.0 per cent of the total, with an average annual "crude" rate of 91.4 per 100,000 corresponding population. For the non-Puerto Rican population, the percentage in this category was only 31.4, with an average annual "crude" rate of 45.4. However, the true significance of the comparison is concealed by the fact of substantial differences in the age distributions of

TABLE 9.—First Admissions with Dementia Praecox from New York City to All Hospitals for Mental Disease in New York State, of Puerto Rican Nativity or Parentage, 1949–1951

Age (Years)	Number			Per Cent			Average Annual Rate per 100,000 Population		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
5–9	2	1	3	0.6	0.3	0.4	5.9	2.9	4.4
10–14	11	15	26	3.1	4.8	3.9	35.7	46.6	41.3
15–19	49	52	101	13.6	16.6	15.0	166.1	136.7	149.5
20–24	97	51	148	26.9	16.2	22.0	243.8	99.5	162.6
25–34	120	103	223	33.3	32.8	33.1	175.5	125.8	148.4
35–44	47	63	110	13.1	20.1	16.3	90.3	108.8	100.1
45–54	30	27	57	8.3	8.6	8.4	104.0	89.1	96.4
55–64	4	1	5	1.1	0.3	0.7	40.3	7.0	20.5
65–69	—	1	1	—	0.3	0.1	—	16.9	12.1
Total	360	314	674	100.0	100.0	100.0	105.0	79.5	91.4

TABLE 10.—First Admissions* with Dementia Praecox from New York City to All Hospitals for Mental Disease in New York State, 1949–1951, Classified According to Age

Age (Years)	Number			Per Cent			Average Annual Rate per 100,000 Population		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
5–9	41	7	48	0.8	0.1	0.4	5.2	0.9	3.1
10–14	107	87	194	2.1	1.6	1.9	16.6	14.0	15.3
15–19	508	417	925	10.0	7.8	8.9	78.0	61.1	69.4
20–24	1,056	739	1,795	20.9	13.8	17.2	132.5	81.4	105.3
25–34	1,742	1,813	3,555	34.4	33.9	34.2	98.9	90.7	94.5
35–44	1,018	1,385	2,403	20.1	25.9	23.1	56.4	68.6	62.9
45–54	414	610	1,024	8.2	11.4	9.8	24.8	35.6	30.3
55–64	148	231	379	2.9	4.3	3.6	12.2	19.2	15.7
65–69	15	40	55	0.3	0.8	0.5	3.9	9.4	6.8
70–74	5	12	17	0.1	0.2	0.2	2.1	4.4	3.3
75 or over	4	8	12	0.1	0.1	0.1	2.0	2.9	2.5
Total	5,058	5,349	10,407	100.0	100.0	100.0	45.4	45.3	45.4

* Exclusive of those of Puerto Rican nativity or parentage.

TABLE 11.—AVERAGE ANNUAL RATES OF FIRST ADMISSIONS WITH DEMENTIA PRAECOX FROM NEW YORK CITY TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, PER 100,000 CORRESPONDING POPULATION, 1949–1951

Age (Years)	Average Annual Rate among Puerto Ricans (a)			Average Annual Rate among Remainder of Population of New York City (b)			Ratio of (a) to (b)		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
5–9	5.9	2.9	4.4	5.2	0.9	3.1	1.1	3.2	1.4
10–14	35.7	46.6	41.3	16.6	14.0	15.3	2.2	3.3	2.7
15–19	166.1	136.7	149.5	78.0	61.1	69.4	2.1	2.2	2.2
20–24	243.8	99.5	162.6	132.5	81.4	105.3	1.8	1.2	1.5
25–34	175.5	125.8	148.4	98.9	90.7	94.5	1.8	1.4	1.6
35–44	90.3	108.8	100.1	56.4	68.6	62.9	1.6	1.6	1.6
45–54	104.0	89.1	96.4	24.8	35.6	30.3	4.2	2.5	3.2
55–64	40.3	6.9	20.5	12.2	19.2	15.7	3.3	0.4	1.3
65–69	—	16.9	12.1	3.9	9.4	6.8	—	1.8	1.8
70–74	—	—	—	2.1	4.4	3.3	—	—	—
75 or over	—	—	—	2.0	2.9	2.5	—	—	—
Total	105.0	79.5	91.4	45.4	45.3	45.4	2.3	1.8	2.0

the two populations (table 10). Puerto Ricans, a migrant population, are younger. The median age of first admissions of Puerto Rican origin with dementia praecox was 27.7 years, compared with 31.3 years for the non-Puerto Ricans. Hence, it is necessary to adjust for such differences.

It may be noted that the average rate of first admissions with dementia praecox rose among males of Puerto Rican origin to a maximum of 243.8 per 100,000 corresponding population at ages 20 to 24. The rates fluctuated with some irregularity among female Puerto Ricans, but in general they had higher rates than males at the older ages. The trends were more clearly indicated among the non-Puerto Ricans. The average annual rates among males rose to a maximum of 132.5 at ages 20 to 24, and then decreased rapidly to minima at advanced ages. The average annual rates among females of non-Puerto Rican origin rose to a maximum of 90.7 at ages 25 to 34. Below age 35, males had higher rates than females. The reverse was true after age 35.

Comparing the average annual rates of first admissions with dementia praecox among Puerto Ricans and the remainder of the population of New York City (table 11), it is apparent that, with one minor exception, the rates for the former were in excess in every age group. These differences may be summarized by the usual process of standardization (table 12). The population used as the standard was that of New York State as of April 1, 1950, aged 15 years and over, divided into intervals of 5 years. Using these age and sex proportions, we obtained a standardized rate of 99.4 first admissions with dementia praecox per 100,000 population among Puerto Ricans, compared with 55.6 for the remainder of the population, the former being in excess by 79 per cent. The excess was more than 100 per cent among males of Puerto Rican origin. The standardized rate for females of Puerto Rican origin was also in excess, although only by 57 per cent. Among Puerto Ricans, the standardized rate for males exceeded that of the females by 33.5 per cent. Among the remainder of the population, there were no significant sex differences.

TABLE 12.—AVERAGE ANNUAL STANDARDIZED RATES OF FIRST ADMISSIONS WITH DEMENTIA PRAECOX FROM NEW YORK CITY TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1949–1951

	Puerto Rican (a)	Other (b)	Ratio of (a) to (b)
Males	114.3	56.5	2.0
Females	85.6	54.5	1.6
Total	99.4	55.6	1.8

SUMMARY

Puerto Rican migration to the United States has been directed predominantly to New York City. As a result, the number of those of

Puerto Rican nativity has grown in that city to considerable proportions, being estimated at 355,000 in 1953, or approximately five per cent of the total population. The migration has been influenced very largely by economic factors, such as the search for jobs. As is inevitable in these circumstances, Puerto Ricans were limited very severely in their choice of occupations. They were handicapped still further by their inability to speak English. As a result of the combination of such factors, Puerto Ricans have been segregated to a high degree in areas of the city which are substandard with respect to housing and health.

Some of the consequences appear from an examination of the statistics of first admissions from New York City to all mental hospitals in New York State. Between October 1, 1948, and September 30, 1951, there were 1,163 such first admissions of Puerto Rican origin, or an average annual rate of 157.7 per 100,000 population. The corresponding rate for the remainder of the population of New York City was only 144.5. However, since the Puerto Ricans were very largely migrants, their age distribution was different from that of the remainder of the population, in such a way that it concealed the true order of the difference of rates. When the Puerto Rican population and the remainder of the population of New York City were compared on an equivalent basis of age and sex proportions, then the average annual rates of first admissions became 239.3 for Puerto Ricans and 185.5 for the others.

Because of their concentration at the younger age levels, Puerto Rican admissions to the mental hospitals included a large proportion with dementia praecox, and an unduly low proportion of admissions with psychoses of old age. The rate of first admissions with dementia praecox, when corrected for age and sex proportions, was 99.4 per 100,100 for Puerto Ricans, and 55.6 for the non-Puerto Ricans.

The higher rates of first admissions to mental hospitals among Puerto Ricans are associated in large part with difficult circumstances of life—restriction to less desirable jobs, with lower wage levels, and consequently lower standards of living. On the other hand, there is the probability that migration is also an important factor. A migratory population is not a random selection from the total population.

On the basis of the average annual rates of first admissions among Puerto Ricans during 1949–1951, and the annual death rates in 1950 (5), the number of first admissions to mental hospitals in New York State among a hypothetical population of 100,000 male Puerto Ricans born in New York City in 1950 would be 15,848 before the expiration of the generation, or an expectation of mental disease of 158.4 per 1,000. The corresponding expectation at birth for female Puerto Ricans would be 165.3 per 1,000. At this writing, there are no corresponding expectations for the total population. In 1940, however, the expectation of mental disease at birth in New York State was 80.5 per 1,000 for males and 82.0 for females. Since the rates of first admissions have risen during the decade 1940–1950, and the death rates have fallen, it is certain that the expectation of mental disease must be higher in 1950, and a reasonable estimate would be approximately 100 per 1,000. Thus, it is clear that a person of Puerto Rican origin has a greater probability of developing a mental disease during a life time than an average member of the entire population.

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THE USE OF CHLORPROMAZINE IN PSYCHOTHERAPY

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Since the discovery of chlorpromazine (also known as Thorazine, Largactil, Megaphen, Compound 2601-A, and R. P. 4560) in France in 1950, it has been quickly accepted by physicians as a valuable drug in certain psychiatric disorders, especially those disorders in which anxiety, aggression or agitation is a prominent symptom. It is now a well-known fact that the drug was discovered while seeking a more efficient antihistamine preparation. In 1952, its action on psychiatric patients was reported in the French literature (2, 3), and it quickly came into general use on the continent. The first reports came out of this country in 1954 (7, 8, 11), and in May, 1954, it became commercially available in the United States.

Following the initial reports there appeared a number of papers on the use of the drug (1, 4, 5, 6, 8, 9, 10). Although the authors have cited only a few of the reports, all of the published material had one thing in common: Each evaluated the drug on a group of patients, and the results were tabulated in terms of the whole group rather than in terms of the individual. In fact, these studies were made in terms of a large group of patients, and the findings presented the statistical changes which took place in the group. These studies failed to describe what happened psychodynamically with individual patients.

Purpose and Method

The purpose of this study was to make detailed observations of individual patients undergoing Thorazine treatment. The authors chose patients who were in regular psychotherapy. Careful observations were made on appearance, behavior, emotional reactions, content of thought and sensorium, before, during, and after chlorpromazine therapy. The conflicts and the mechanisms of defense were also studied. Behind this purpose lay the idea that it might be possible to reach some conclusions about the use of chlorpromazine in psychotherapy. Since detailed studies are time consuming, it was not felt possible to include more than four patients in this initial effort.

The four patients were all men, hospitalized in the Veterans Administration Hospital at Hines, Illinois. They were started in psychotherapy (three times weekly) several weeks before a placebo or chlorpromazine[3] was administered and followed by the same therapist three times weekly in regularly scheduled 30-minute psychotherapeutic sessions throughout the study.

Each of the patients was given a 10-week period of treatment with Thorazine and an equal period of time with placebo. The placebos looked exactly like the chlorpromazine and were given in the same amounts at comparable stages in the treatment.

Chlorpromazine—50 mg. daily for 1 week, followed by:
Chlorpromazine—100 mg. daily for 2 weeks, followed by:
Chlorpromazine—200 mg. daily for 3 weeks, followed by:
Chlorpromazine—400 mg. daily for 4 weeks.

The second group was given a chlorpromazine placebo on the same routine as above. Neither the patient nor the psychotherapist knew which group was on the drug and which was on the placebo.

At the end of a 10-week period, the groups were reversed, i.e., the first group was placed on the placebo, and the second group was given the chlorpromazine as scheduled above. This reversal was made immediately. At the end of the last day of the 10-week period, the one type of pill was discontinued and the next morning the build-up of the other was begun.

It will be noted that the chlorpromazine was gradually built up from 50 mg. daily to 400 mg. daily, and held there for four weeks. When the

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[3] The chlorpromazine placebo tablets were generously supplied by Smith, Kline & French Laboratories, Philadelphia, Pennsylvania.

drug was discontinued, it was cut off suddenly in order that the effects of the medication could be observed more clearly.

This study was arbitrarily terminated two weeks after the last medication (chlorpromazine or placebo) was discontinued regardless of the fact that the patients were continued after this in psychotherapy.

Patients in Study

Perhaps it will give a clearer picture of the study if a brief summary of the history of each patient is given.

1.S was a 26-year-old white, single, male, who lived at home and ran the farm for his elderly father and mother in addition to working as a part-time carpenter. He had been rather sterile in his interpersonal relationships all of his life. However, he remained psychologically compensated until a few months before his younger brother was released from the Army. It has never been clear what the patient's deep feelings were about his brother, although it was obvious that the brother was more favored, more aggressive, and more vocal than the patient. It is quite possible that the patient looked upon the return of his brother to the farm as a threat. The younger brother would take the patient's place as a leader, and, in effect, the patient would be working for his younger brother.

In any case 1.S began developing a depression before his brother's return. This was characterized by a feeling of hopelessness. His main complaints were about pains in his body and the fatigue associated with it. Because of the discomfort and the fatigue, he had been unable to work for over six months. He had consulted several physicians about these symptoms but had not been able to receive any significant relief. He was in the hospital approximately six months before he was started on psychotherapy with one of the authors (H. L. N.). During this period he was seen briefly several times a week on ward rounds. He was quiet and emotionally rather dull and never exhibited any strong affect. He was in group psychotherapy and was active in the regular program (including manual arts therapy).

At the time psychotherapy was initiated, the patient had lost the more dramatic elements of the depression and was complaining less of pains. He felt he was too tired to get a job again and take his place in society, even though he was at this time going to his sister's home in nearby Chicago each week-end on a pass. The psychotherapist observed that he was rather withdrawn. Interviews soon brought out frightening memories of bestiality.

His diagnosis was: Depressive reaction, superimposed upon an underlying schizoid personality.

2.B was a 32-year-old, white, single, male crane operator who was brought to the hospital shortly before psychotherapy was begun because he had threatened to kill some men at work.

For seven years prior to admission, he had been seen in psychotherapy, one to three times weekly by private psychiatrists. No precipitating factors were found which brought about the deterioration in his condition which necessitated hospitalization.

At the time psychotherapy was started, the patient was having a few auditory hallucinations. He was moderately agitated with ideas of reference, and there was a great deal of somatization accompanied by death fantasies. His ego strength was at such low ebb that he immediately produced a great deal of hostility and homosexual material in therapy. The picture was essentially the same when he was started on this research program.

The diagnosis was: Schizophrenic reaction, paranoid type.

3.K was a 38-year-old, white, married, male draftsman who had always led a very restricted emotional life. He was very religious and claimed he never had any hostile feelings of any kind. "That's not the American way," he would say. He said that he did not enjoy sexual relations with his wife, but did have intercourse "to get a family."

His hospitalization was precipitated by his father-in-law's death. The old man had moved in with the patient about a year previously and had rented out his own house, thus earning money at the patient's expense. The situation was made more tense because the father-in-law suffered from chronic pulmonary edema and coughed a great deal. While in the Army, the patient had been hospitalized for a protracted period of time for observation because of pulmonary scars. The father-in-law's lung trouble stirred up all of 3.K's anxieties in this area.

When the father-in-law died, the patient became very disturbed and left the house in his bed clothes one wintry night. The next morning when the psychotherapist saw him, 3.K had lost his agitation. He was depressed, somewhat withdrawn and admitted having heard threatening voices. His condition was essentially the same when he was started on this research program.

Diagnosis was: Schizophrenic reaction, schizo-affective type with depression.

4.P was a 33-year-old white, single, unemployed male who was discharged from the Navy in 1944 with a diagnosis of anxiety reaction. Upon reviewing the history, it would seem that this diagnosis was justified at that time; however, over the course of years, alcoholism became an increasing problem with this man. For example, he was admitted to the Veterans Administration Hospital, Hines, Illinois, 10 times for severe disturbances associated with alcoholism in the five years preceding this admission. During this period he had worked very little, had been in minor difficulties culminating in his being jailed several times, and had had only one interpersonal tie, which had been severed four months prior to his admission. During the months preceding this hospitalization, the patient had led the life of an alcoholic derelict while living on West Madison Street in the most degenerate environment imaginable.

At the time of this hospitalization, he was intoxi-

cated, had generalized tremors and was suffering from visual hallucinations.

Before starting on the research program, he was free of his hallucinations, was in good contact and was able to follow the therapeutic activities program on the ward.

Diagnosis was: Passive aggressive personality with alcoholism.

Results

Although careful detailed observations were made throughout all phases of the project, it was not possible to point out specific effects of the chlorpromazine during the gradual buildup and the maintenance dosage. All patients got along reasonably well during this time with fluctuations compatible with their total situation.

The abrupt discontinuance of the chlorpromazine, however, brought sudden dramatic changes which could be correlated precisely chronologically with the discontinuance of the chlorpromazine. Sudden dramatic changes were present at this time in each of the four patients, regardless of whether the chlorpromazine was followed immediately by placebos. Furthermore there was no dramatic change when the placebos were discontinued in any case. The changes which occurred on termination of the chlorpromazine are delineated below for each individual patient.

1.S (the farm boy, part time carpenter, who was diagnosed as depressive reaction in a schizoid personality) had more energy immediately after the chlorpromazine was discontinued. He was less depressed, his dreams seemed more real to him, guilt feelings showed up in the dreams for the first time, he stated he was full of feelings (affect) which was very different from his usual self, he talked more freely in therapy, he had more anxiety, and for the first time he discussed his future and the possibility of obtaining employment.

It is interesting to note that this man looked upon the medication as a threat to him. It made him more lethargic and psychologically impotent so that it seemed to him that his depression was returning. Later when the placebo dosage was started, he protested against taking it. At that time he stated he did not want the medication, that he would rather put up with his tension (which had come upon having the chlorpromazine withdrawn) than to feel constantly tired.

He actually did feel tired again when placed on the placebo; however, this cleared up in a few days and there was no sudden change noted when the placebo was later discontinued.

2.B (the crane operator diagnosed as a schizophrenic reaction, paranoid type) cried for the first time in therapy on the day after chlorpromazine was discontinued. He was generally more active both physically and psychologically, and there was an increase in the warmth of his interpersonal relationship with the therapists. He dreamed for the first time. When he had homosexual preoccupations he was able to say "to heck with them" (evidence of more ego strength), he talked of future plans for the first time, he had some insomnia and a few somatic complaints, he helped out on the ward work for the first time, and he would listen to the psychotherapist's comments with much more interest.

This man had no change in his psychological status after the placebo was discontinued.

3.K (the inhibited draftsman with a diagnosis of schizophrenic reaction, schizo-affective type) exhibited a marked change the next day after the chlorpromazine was discontinued. To sum it up, he disintegrated. During the course of therapy, he had lost the depressive aspects of his illness, he had been in good contact on an open ward and had been taking week-end passes home even though his personality had remained about as rigid as before.

However, after the chlorpromazine was discontinued, he became very depressed and was retarded in his speech, movement and thought. He was certain that he was about to die. He developed the delusion that his wife was dead and another woman, similar to her, had been substituted in her place. His wife, a woman very devoted to him, asked that he not be given any more week-end passes because of this strange behavior. He became confused, was unable to follow the program on the open ward, and had to be returned to a more regulated environment.

There had been no change in his condition when the placebo was discontinued.

4.P (the man who had been wandering up and down West Madison Street, chronically intoxicated, with the diagnosis of passive-aggressive personality, with alcoholism) had adjusted well to the open ward routine, was

generally friendly and had established a close emotional relationship with the therapist and was attempting to deal with problems of hostility.

As soon as the medication was discontinued, he became very hostile. This was such a problem with him that he could hardly concentrate on his work in manual arts therapy. He slept poorly and his tremor returned. He was argumentative with the hospital personnel and with other patients. At this time he became angry because some of the other patients would get the newspaper which came to the ward every morning and he would have to wait his turn to read it. He began buying his own paper and, after reading it, would tear it into little pieces and throw it away. While in therapy session he would become so angry that he could not follow a train of thought or help work through his dream material.

Discussion and Conclusions

It is noted that the close psychotherapeutic relationship demonstrated no impairment of intellectual functioning during the course of chlorpromazine treatment, nor any change in the intellectual abilities when chlorpromazine was discontinued. However, all patients showed evidence of a marked accentuation in feelings when chlorpromazine was discontinued. 4.P had exhibited prominent feelings of hostility well controlled during chlorpromazine therapy. When the drug was stopped, the hostility became incapacitating. In another, depression had been the predominant affect, but it was not incapacitating during chlorpromazine therapy. When this therapy was discontinued, he developed a psychotic reaction, schizo-affective type with depression. Another cried and dreamed for the first time after being removed from chlorpromazine. These observations indicate stronger affect. This latter patient also became mildly insomniac and showed a new anxiety about somatic symptoms, associated with an increase in psychic and physical activity. The authors feel that these symptoms can be attributed to an increase in affect.

The other patient described himself as full of feelings, including anxiety. Dreams were more real and guilt showed in them for the first time. This patient, though inhibited in his expression of feelings, certainly expressed them more than at any time in his hospitalization. We believe that the affect which had been mobilized by the psychotherapy was expressed only after the chlorpromazine was discontinued.

It would appear to the authors that chlorpromazine in some way masks the affect and thus reduces the amount of anxiety experienced by the ego. This would seem to fit very well with the studies which have pointed out that disturbed wards are quieter when chlorpromazine is used. With less affect and therefore less anxiety, there is less acting out of the affects and less need for defense mechanisms.

The role of chlorpromazine in psychotherapy can be discussed from the standpoint of these four patients and also this theoretical standpoint.

In the four patients discussed here the affect was much increased when the chlorpromazine was discontinued. The question arises whether this was helpful in the psychotherapy. It is noted that 3.K and 4.P were unable to deal with problems psychotherapeutically after discontinuance of the chlorpromazine. Attempts at psychotherapy had to be dropped with 3.K. On the other hand, 1.S and 2.B made more rapid progress after being removed from chlorpromazine treatment.

Psychotherapy requires that mutually meaningful communications be established between the patient and the therapist. Many factors, of course, influence this. A common variable is the degree of disturbance of the patient. If the disturbance is too great, then the psychotherapy is impeded or is ineffective. On the other hand, unless there is some disturbance, experienced as discomfort by the patient, there is no motivation for psychotherapy by the patient.

It appears to us that we experienced several types of situations in this project. 3.K and 4.P seemed to deal more effectively with psychotherapy while receiving relatively large amounts of chlorpromazine. When the medication was discontinued, they were too disturbed for psychotherapy. 1.S and 2.B, on the other hand, did better after being removed from chlorpromazine. Their anxiety was notably increased at this time, but they did not become disorganized and the psychotherapy seemed more effective.

Since the primary purpose of this project was to determine the effects of the chlorpromazine on the psychodynamics, it was not possible to manipulate the chlorpromazine dosage. But it is possible that such manipulation in each patient would have resulted in finding a dosage which would have been optimal for psychotherapy in that particular patient. Particularly in 4.K and 3.P, review of the developments suggests that a gradual manipulation of dosage should have established an optimal level. Perhaps the optimum level for 1.S and 2.B was zero at the time the dosage was discontinued. The fact that the psychotherapy decreases anxiety and that chlorpromazine also decreases anxiety suggests that the optimum level may be different at different points in the patient's therapy.

Summary

1. Four patients in psychotherapy were carried for 10 weeks on gradually increasing doses of chlorpromazine (50 mg. to 400 mg. daily), at the end of which time the medication was suddenly discontinued. This was followed (or preceded) by 10 weeks on a chlorpromazine placebo (a double-blind experiment).

2. Careful notes were made of the psychodynamic changes which took place in each patient.

3. No effects which could be specifically attributed to the chlorpromazine were demonstrated during the gradual buildup and continued treatment with the drug. However, when it was suddenly discontinued, there was a dramatic change in each patient. These changes were reviewed and discussed.

4. The results of this investigation suggest that chlorpromazine is useful in psychotherapy when it reduces internal disturbance enough to allow good contact with the therapist. On the other hand, psychotherapy may be impeded by a dosage which is high enough to dull the affects and/or the motivation for treatment.

The authors are indebted to Dr. Francis J. Gerty, Professor of Psychiatry and Director of the Division of Psychiatry, University of Illinois College of Medicine, for reading this paper and making valuable suggestions.

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SOME OBSERVATIONS ON THE MINIMAL EFFECTIVE DOSAGE OF CHLORPROMAZINE

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Since the discovery of the phenothiazine derivative, chlorpromazine,[1] in 1951 by the Rhone-Poulenc Laboratories, an enormous amount of the literature that has been produced reflects the enthusiastic reception of the drug. Reviewing some of the more recent of this literature it is apparent that there are many differences of opinion regarding administration and dosage, nor does it yet appear possible to anticipate which sort of patient is likely to do well and which is not. Generally, the impression is that overt tension and overactivity predominate in the symptomatology of those treated with marked success. Winkelman (11) has recorded the efficacy of the drug: in the symptomatic control of severe excitement; and although there are reports of its beneficial usage in depressive states, the most obvious results are in those patients showing increased and pathological psychomotor activity (2). Goldman (4) has observed that chlorpromazine is particularly effective in persons psychotic for relatively short periods, but it is evident that some effect is often obtainable after long years of psychotic withdrawal, and Seager's (10) observation would support this.

In spite of the recent tendency to use large doses there is still much diversity of opinion. Kinross-Wright (7) in his series used up to 3,400 mgm. per day, the maximum average being 1,400 mgm. per day, and he suggested that the failures noted by Janzarik (5) were possibly due to inadequate dosage; yet good results have been recorded with much smaller quantities. Winkelman (11) used 30–50 mgm. per day in non-hospitalized senile patients, while Seager's (10) dosage also in elderly psychotics was 150 to 200 mgm. daily. Kurland's (8) maximum dosage with younger psychotics was 400 mgm. daily. Charaton (2) reviewing the response of 42 female patients of mixed diagnoses, but all showing increased psychomotor activity, found a symptomatic improvement in seven out of eight impulsive aggressive schizophrenics, using average dosage of 200 mgm. daily.

Typically most studies have initiated treatment by parenteral administration, and although there appears to be a smaller comparative dosage needed, no writer has noted other advantages. Lehmann and Hanrahan (9) stated categorically that parenteral administration is best, while Seager (10) stated that there is no indication for parenteral therapy unless the patient is confused and agitated. The response to administration is rapid, and the effect is often discernible within 3 days, often 24 hours (1); but Professor Elkes (3) has warned of the misleading improvement that occurs during the first 14 days, followed by a complete relapse.

The tolerance to chlorpromazine is variable. Side effects may be noted with smaller dosages, but it is apparent from the excellent review of the complications of treatment by Kinross-Wright (7) that most of the examples given were of patients receiving 800–1,000 mgm. daily.

From the diversity of results and the enormous potential of chlorpromazine in the field of psychiatry, it is clear that, in spite of the enormity of the data already accumulated, there is much more work to be done.

The present investigation was started in an attempt to evaluate the usefulness of Thorazine in the management of subacute and chronic psychotic patients; whether its use would diminish the amount of "maintenance ECT" which is an invariable regime wherever such patients are hospitalized; and to determine whether there were any easily discernible clinical features that would facilitate an estimation of the response that could be expected to the drug in an individual patient.

We were also intrigued with the conflicting reports in the literature in regard to the minimal dosage required in chronic patients if their behavior was to be mitigated. We regard

[1] Marketed as "Thorazine", "Largactil", and "Megaphen".

the essence of pharmacological treatment to be the lowest dosage required to produce the desired effect, rather than finding how much of a drug a patient can tolerate without undesirable results. This method of approach, of using minimal dosage, served another purpose to which we will refer later.

Characteristics of the Cases Studied

The investigation was carried out in women's service, and the total number of patients in the group studied was 32.

The average age of the group, at the time treatment was started, was 48.6 years. The average age of the onset of the illness was 29.0 years.

The mean duration of the present period of hospitalization was 5.5 years (varying from 2 months to 19.10 years). Of the 32 patients, 25 (78.2%) had had previous admissions to mental hospitals, mostly at the same hospital.

All the patients had been treated with somatic methods with only temporary, minimal, or no improvement. The majority were receiving maintenance ECT at varying regular intervals. The number of ECT given prior to a trial on Thorazine varied from 4 to 212 with an average of 56. Those who had a lower number of ECT treatments, and there were few, were found to have contraindications or had been changed to another type of therapy, e.g., sub-coma insulin. Seven of the patients had also received insulin treatment varying from 7 (one patient who was apparently unsuitable for this treatment) to 56 with an average of 32. One patient had also received hydrotherapy.

Method of Selection

For convenience the criteria for selection were kept to a minimum. One of the aims was to discover whether the necessity for maintenance ECT could be lessened. This was considered important as the need for maintenance ECT is often a reason for prolonged hospitalization even when a patient is capable of maintaining some sort of adaptation in her normal setting in the intervals between treatments. This is largely because, except in urban centers, this type of maintenance therapy is impractical. More important, and applicable to this study, is the fact that ECT is always associated with some degree of risk and that repeated numerous treatments may and probably do result in cerebral and other damage (6).

The criteria for selection then were that the patient had been given an adequate trial using somatic therapy with no definitive result; the majority were receiving maintenance treatment; and that there were definite indications necessitating continued treatment.

Indications for Treatment

The indications for treatment in psychiatry are varied, and when an attempt is made to define one facet that may be taken as an absolute indication, it is impractical because the indications are not amenable to scientific measurement but only to subjective and objective evaluation. In the main, the consideration is individual for the patient and is most often reflected in behavior. However, the symptoms present in the patients under consideration can be listed as follows: tenseness, anxiety, apprehensiveness, delusions, hallucinations (generally "painful" to the patient), antagonism, sarcasm, hostility, combativeness, resistiveness, mutism, depression and denudity. It will be appreciated that some of these terms are almost synonymous; that the estimation as to whether they are indicative of the need for treatment is a question of degree; and that any symptom listed was not the sole indication, there being an admixture of the various symptoms in no proportionate manner.

Treatment was started with Thorazine in doses of 10 mgm. b.i.d. or t.i.d. orally. Increase in dosage was made in small amounts and more slowly in time than is generally advocated in the literature. Exceptions to this arose if the patient was so disturbed that a higher dosage was needed more rapidly. The "minimal effective dosage" outlook was regarded as important, not only to minimize the risk of possible complications, but also from the practical approach of cost. Not only is it desirable to limit the cost of treatment for an institution but also for the individual. If a patient is helped, with the aid of a drug such as Thorazine, to reintegrate to an extent that permits his discharge from the hospital, it means that he will have to continue taking the drug at home. This is important, for to

discharge a patient who is taking a drug in such doses that the cost becomes prohibitive is to invite relapse. It is to be remembered that state hospital patients, who form the majority of mentally ill people, have not the economical resources to budget for prolonged and expensive treatment.

Method of Study

To obviate the effect of test conditions an attempt was made to eliminate both the patient's and the nursing staff's awareness of the assay. Patients were not started on the drug at one time, nor was the survey confined to patients on one ward, but throughout the service. After the patients had been selected, a further 28 were also given Thorazine but were not included in the analysis. Furthermore the daily routine was in no way changed except for the cessation of maintenance shock therapy. Those engaged in group therapy with one of us (M.J.K.) prior to treatment continued. Detailed reports of the nursing staff supplemented the regular examination and evaluation by a psychiatrist.

Results

The results of treatment are being reported in two phases.

At the time of the first phase, the results were recorded in two groups: the improved and the failed.

Various aspects of these groups were compared, at this time, to see if any definite characteristic was present in one and not the other to permit a tentative method of prognosticating the response to Thorazine.

The improved group

An attempt was made to assess the degree of improvement by designating it as minimal, moderate and marked.

As an example of the first was an elderly patient who had been in the hospital for many years. She spent her days sitting in a chair and emitting high-pitched unintelligble sounds continuously. She had received numerous treatments, to no avail. Eventually, she was given sodium amobarbital, gr. 3 every 4 hours, a practice that evidently had been followed for some considerable time. This treatment never stopped her vocalizations although it muted them slightly. At the time the appraisal was made she was quiet most of the time with only periodic short outbursts. She also could be persuaded to help in small ways on the ward which hitherto she had steadfastly refused to do.

Moderate improvement indicates a generalized increase in the patient's ability to make a hospital adjustment, improvement in interpersonal relationships, and mitigation of the initial symptoms, all resulting in what may be termed an improved behavioral pattern.

The marked improvement signified an almost dramatic response. This was most noticeable in one patient who was extremely overactive, combative, denudative, uttering continuously vociferous oaths and refusing to eat or drink. Within 72 hours the change was remarkable. She was capable of cooperating toward routine, and her previous behavior had disappeared.

The results, using the above groupings, are as follows: Of the total number (32), 20 patients were considered improved; in the proportion of marked improvement 2, moderate improvement 12, minimal improvement 6. Twelve of the total number of 32 showed no improvement and were designated as the failed group.

Comparison of improved and failed groups

At the end of the first phase the points mentioned earlier were applied to each group for comparison.

These points yielded no appreciable differences that might be useful in the selection of patients to be treated with Thorazine.

A survey of the patient's premorbid personality, as reported initially, was made to see if it differed in the two groups.

As might have been expected, from the above facts, the description of the various personalities had much in common.

In the improved group the common method of describing the personality was as follows: obsessive, gay and friendly, sweet and sensitive, energetic, suspicious, solitary, shy and reserved, afraid to hurt the feelings of others, a usual interest in religion and an inability to express anger.

In the failed group the descriptions used

	Total Number—32	
	Improved—22	*Failed—12*
Average age	44.1 yr. (20–63)	41.25 yr. (30–52)
Total duration of illness	11.7 yr. (2–23)	11.4 yr. (1–31)
Average age of onset of illness	31 yr. (15–41)	29.0 yr. (16–45)
Average length of present hospitalization	4.1 yr. (2–19 mo.–10 yr.)	3.5 yr. (3 mo.–13 yr.)
Previous treatment	All had ECT	All had ECT
Average no. of ECT	58 (4–212) 3 had insulin	55 (12–93) 4 had insulin
Average no. of insulin treatments	51.2 (50–54)	13 (7–56)
Diagnostic classification		
Schizophrenic, paranoid	13	7
Schizophrenic, catatonic	4	4
Schizophrenic, undifferentiated	2	1
Paranoid state	1	0
Average dose of thorazine	173 mgm/day (50–400 mgm.)	187 mgm/day (50–600 mgm.)
Length of time receiving thorazine	5 wk.–3 days (7 days–11 wk.)	3 wk.– 4 days (10 days–11 wk.)

were: quiet, seclusive, shy, solitary, jolly or worriers, talkative, nervous, stubborn, crabby and, in 7 cases, ardently religious.

It was initially considered that this approach offered a guide in the pre-treatment assessment. The most noticeable points were that so many patients in the first group were described as being incapable of expressing anger and in the second group as being "ardently religious".

However, it was concluded that these points were too vague and the method of assessment of the premorbid personality too crude to be of use as a basis for differentiation. Possibly, investigation along these lines might be profitable.

At this juncture it was thought that the failed group, as well as the minimally and moderately improved groups, might be benefited both by an increase in the amount of the drug and length of time it was administered. The dosage was gradually increased as before.

Before the next and final phase of assessment of this study the total number of patients was reduced by two being discharged from the hospital. Both were taking Thorazine at the time of discharge, one 50 mgm. daily and the other 40 mgm. daily.

At the time of the final evaluation all the remaining 30 patients were assessed as improved. Using the same methods of assessment the total result was as follows: markedly improved 2, moderately improved 18, minimally improved 10.

Division of these numbers, into those which came from the different groups (originally improved or failed) and the average dose of Thorazine each was receiving, produced interesting observations.

The change in the general picture between the first and final evaluations is important. These patients acted as their own controls. The only factor which was altered between the two assessments was the individual dosage of Thorazine, particularly in the "failed" group. At the final evaluation there were no "failures", and it is justifiable to infer that this could have been due only to Thorazine.

The average dose of Thorazine for the whole group was 212 mgm./day.

The redistribution of the former improved group was as follows:

		Total Number of Patients—18
Markedly improved	2	(formerly moderate improvement)
Moderately improved	11	(formerly minimal improvement)
Minimally improved	5	

The average dosages for these categories were: markedly improved 150 mgm./day; moderately improved 123 mgm./day; minimally improved 208 mgm./day; the average for the group as a whole was 160 mgm./day.

In the previously "failed" group the redistribution was:

	Total Number of Patients—12
Moderately improved	7
Minimally improved	5

The average dosages were: moderately improved 229 mgm./day; minimally improved

300 mgm./day; the average dosage for the group was 266 mgm./day.

Significant differences can be immediately seen in the dosages required to produce improvement not only between, but also within, the groups.

The dosages required in the previously improved group were lower than those needed in the "failed" group to produce an equal improvement.

In the "improved" group the average dose resulting in "minimal" improvement was greater than that needed in the "moderate" or "marked" groups. The same result was seen in the "failed" group.

The only other variable to be considered is the duration of treatment. In the "improved" group this was 14 wk., 1 day and in the initially "failed" group 12 wk., 5 days. The difference is not considered as significant.

The impression remains that there are individual factors which pre-determine the response to Thorazine. No correlation between the blood pressure recordings could be found. The authors believe that the difference in response may be due to the relative, interrelated balance between the parasympathetic and sympathetic systems in the production of anxiety, which is present in every case. Clinical evaluation failed to show any definite measurable basis for this belief, but we anticipate investigating this aspect in the near future.

There is no doubt, from the study of the cases reported, that patients who are to have a favorable response to Thorazine will so react using small doses of the drug and in a short time. We believe that this is important for the reasons already mentioned and that the literature appears to have ignored this approach. This does not mean that larger doses do not help the less responsive patients, as has also been shown in this study.

The symptomatic response in the total group at the time of the final evaluation was quite striking. In no patient did maintenance somatic therapy have to be used. There was a mitigation of symptoms in each patient which differed quantitatively and qualitatively. The content of delusions and hallucinations was often altered. Whereas this might have been threatening before, it became less so; where it had been harsh and abusive, it became kinder and more tolerant. An increased ability to adapt to interpersonal relationships was seen in the alteration of mutism, hostility, depression (the basis of which the patients often described, retrospectively, as fear), anxiety and antagonistic behavior.

No complications were found in the group studied although interesting problems in the use of Thorazine have been observed, from time to time, in other patients, and it is hoped that these may be reported later when more experience of them has been gained.

Conclusions

1. Thorazine is of indisputable value in aiding "social adaptation" in a hospital setting.
2. No specific factors such as age, duration of illness, or diagnosis are apparent, in this series, that may be of use to foretell the expected response to the drug.
3. An impression has been gained that further investigation of premorbid personality and the autonomic nervous system may help in producing such a correlation.
4. The indications for therapy of this kind are symptomatic and behavioral and not diagnostic.
5. The use of ECT, especially "maintenance" treatment, can be diminished.
6. The effective dosage is much lower than most of the published reports would indicate.
7. Those patients who will react favorably do so in a short time and with small doses.
8. The response depends upon factors which are, as yet, immeasurable.
9. The responses obtained have been shown to be directly attributable to Thorazine.
10. No advantage of the intramuscular route when compared with the oral route could be found. Intramuscular injection facilitates the administration of the drug in certain patients.

We wish to express our gratitude to Dr. Robert H. Israel, Superintendent, for permission to publish our results; to the nursing staff for their cooperation and the detailed notes they kept on all patients on pharmacological treatment; and to Mr. William Seigrist, S.K.F., Representative, for his kindness in supplying low dosage tablets of Thorazine when the need arose.

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SOCIOLOGICAL SURVEY OF 7,828 PRIVATE PATIENTS TREATED FOR ALCOHOLISM[1]

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Sociological studies of alcoholics have usually been made on select groups that do not necessarily represent a cross-section of the alcoholic population. For example, such studies have been made of alcoholics coming before municipal courts, those who have been committed to mental hospitals, those on welfare rolls or those treated by community sponsored alcoholic clinics.

Valuable as it is, most of the information that we have regarding alcoholics is based on those seen by public agencies. With this in mind, it was thought that it would be interesting to review the sociological history of 7,828 patients treated privately for alcoholism.

PRESENT STUDY

During the past 20 years (June, 1935, to June, 1955), 7,828 patients were treated by the Shadel Sanitarium for alcoholism. These were all private patients admitted on a purely voluntary basis. The Shadel Sanitarium is devoted exclusively to the treatment of alcoholism. Therapy consisted for the most part of the conditioned-reflex and/or pentothal methods.

Unfortunately the sociological data on these patients are not too complete, especially in the early years of the Sanitarium's existence.

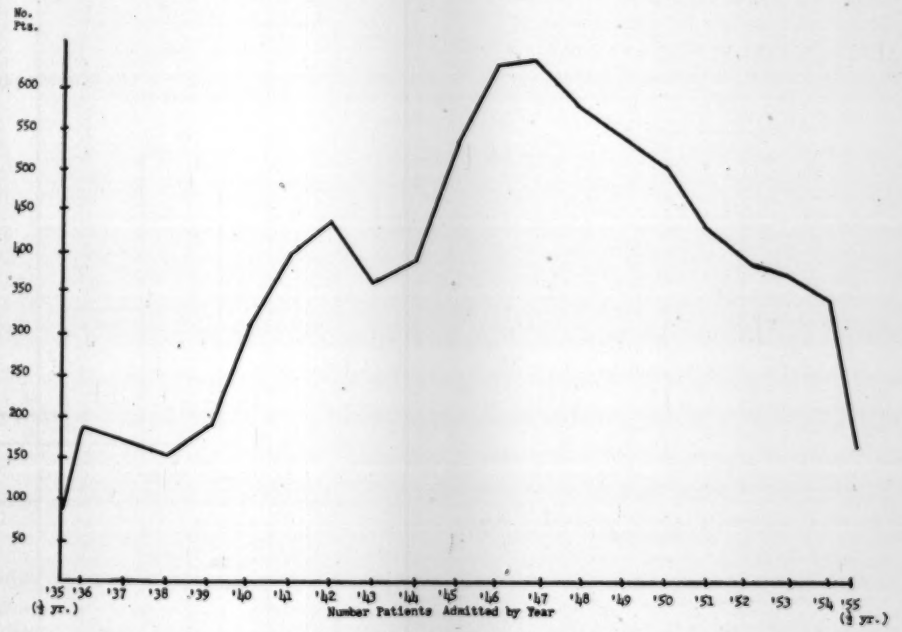

CHART I. Admissions by year (20-year period)

[1] This investigation was supported in part through funds provided for biological and medical research by the State of Washington Initiative Measure No. 171.

[2] From the Shadel Sanitarium, Seattle, Washington.
[3] From the Department of Sociology, State College of Washington, Pullman, Washington.

What is available will be presented factually, with a notation as to the number of patients upon whom information could be obtained. Because of the complexity of the possible factors involved, no attempt will be made to interpret these findings or compare them with the statistics on other groups of alcoholics.

Results

The results of this study can be presented best by the accompanying charts.

Chart I shows that there was a gradual increase in the numbr of patients admitted for treatment up to 1942. During the war years there was a slight drop following which there was an increase in admissions up to 1947. The gradual fall in admission rate since 1947 is probably due to economic factors plus the

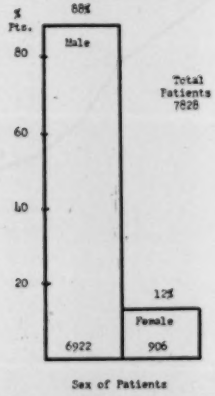

Chart II. Percentage of male and female patients (20-year period)

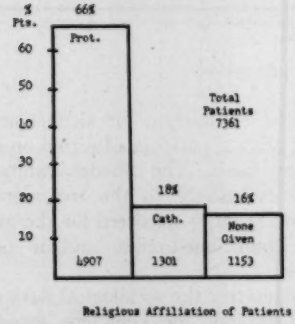

Chart III. Percentage of patients by religion (17½-year period)

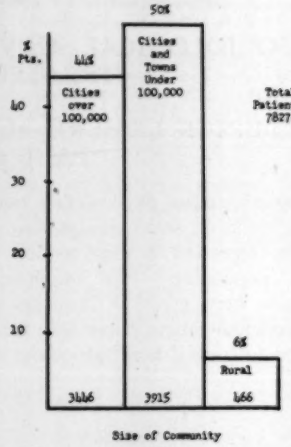

Chart IV. Percentage of patients by type of community (20-year period)

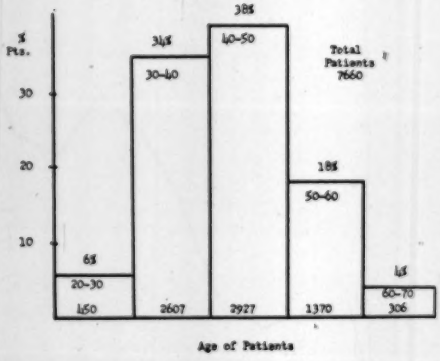

Chart V. Percentage of patients by age (20-year period)

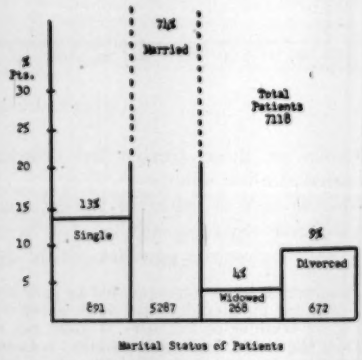

Chart VI. Percentage of patients by marital status (16½-year period)

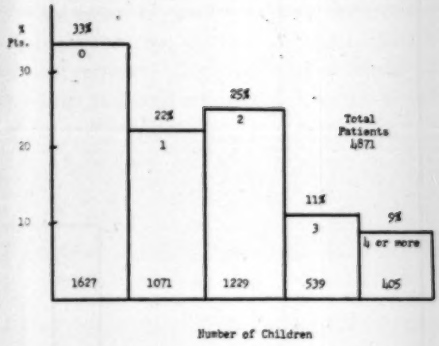

CHART VII. Percentage of patients by number of children (10½-year period)

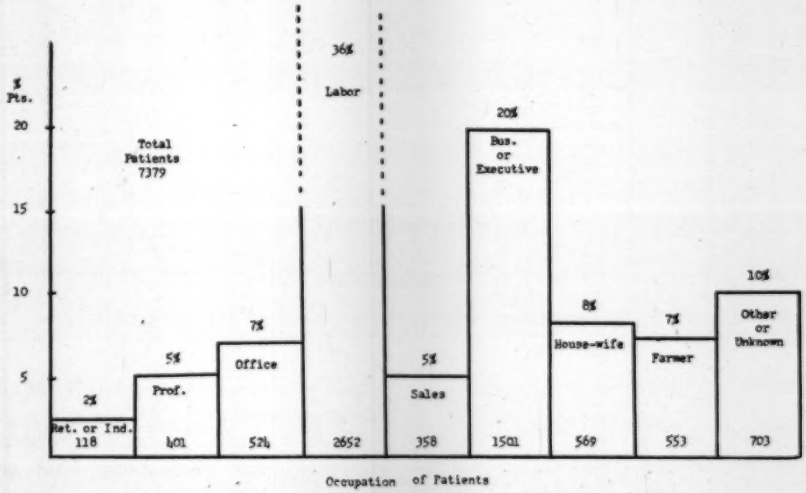

CHART VIII. Percentage of patients by occupation (17½-year period)

possibility that many of the patients in the community who were interested in and suitable for this particular type of therapy had already been treated.

Chart II shows that of the 7,828 patients treated 88% were male and 12% female.

Chart III shows that of the 7,361 patients about whom we had information concerning their religion, 66% were Protestant, 18% Roman Catholic and 16% who gave no religious preference. In addition to these, there were 12 Jews and 6 Greek or Russian Orthodox Catholics.

Chart IV shows that of 7,827 patients 44% came from cities over 100,000 population, 50% from cities and towns under 100,000 and 6% from rural communities.

Chart V shows that 6% of our patients were between 20–30, 34% between 30–40, 38% between 40–50, 18% between 50–60 and 4% between 60–70 years of age. In addition to these, there were 26 patients over 70 years of age.

Chart VI shows that 13% of our patients were single, 74% were married, 4% were widowed and 9% were divorced.

Chart VII shows that of 4,871 patients, 33% had no children, 22% one child, 25% two children, 11% three children and 9% four children or more.

Chart VIII shows that of 7,379 patients, 2% were retired or had independent incomes, 5% were professional people, 7% clerks or office workers, 36% laborers, 5% sales people, 20% business men or executives, 8% housewives, 7% farmers and 10% other or unknown.

Chart IX shows that of 7,030 patients 33% were referred by former patients whom we had treated, 27% by doctors, 5% by relatives, 2% by friends of the patients, 2% by employers, 2% by courts, 9% by our own counsellors, 1% by ministers, 5% through general knowl-

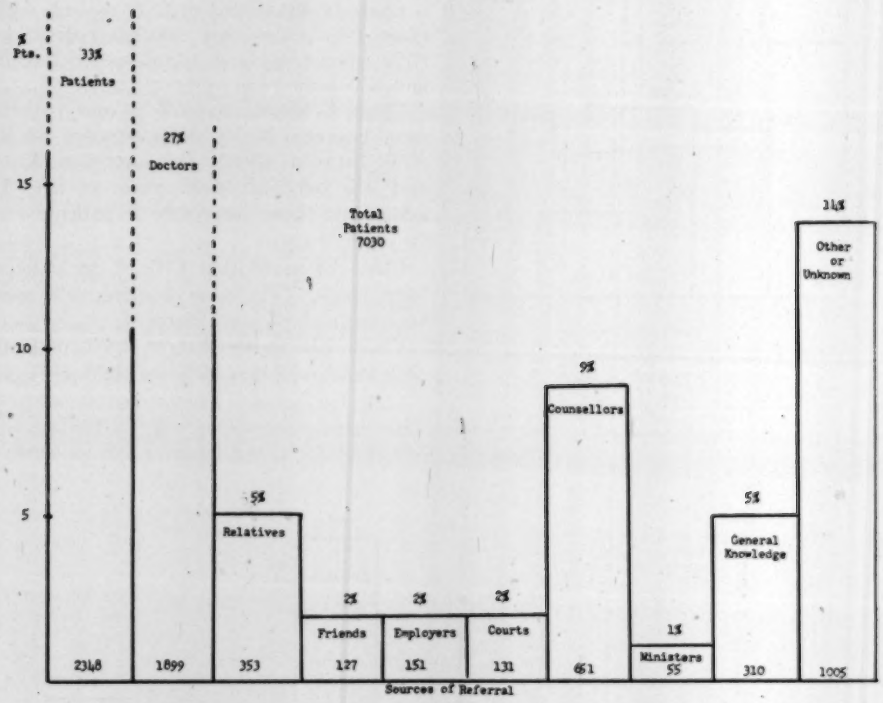

CHART IX. Percentage of patients by source of referral (15½-year period)

TABLE 1.—RESIDENCE OF PATIENTS

Washington	6049	Wisconsin	4
Montana	508	Arizona	3
Idaho	398	Missouri	3
Oregon	277	Oklahoma	3
Alaska	127	Washington, D. C.	3
California	122	Alabama	2
British Columbia	104	Hawaii	2
North Dakota	63	Mississippi	2
Wyoming	26	Panama	2
Utah	23	Florida	1
Minnesota	21	Georgia	1
Alberta	14	Illinois	1
Colorado	10	New Brunswick	1
Nebraska	10	North Carolina	1
Nevada	8	Pennsylvania	1
New York	8	Peru	1
Kansas	6	South Carolina	1
Iowa	5	Tennessee	1
Michigan	5	West Virginia	1
Texas	5	Unknown	1
Ohio	4		
			7,828

edge of the sanitarium and 14% by other or unknown sources.

Table 1 shows the states, provinces and countries from which these 7,828 patients came.

SUMMARY AND CONCLUSIONS

An average or composite picture of these 7,828 private patients who were voluntarily treated for alcoholism during a 20-year period would be as follows: The patient would tend to be a male, laborer, business man or executive of approximately 40 years of age. He would have come from an urban rather than a rural community. His religion would be Protestant; he would be married with one or no children and referred by one of our former patients or a doctor.

This group of private patients differs from the usual concept of the alcoholic patient in several respects. There was a large number of business men and executives. The age of this group was younger than that commonly given for the average alcoholic. There were comparatively few Catholics and a relatively large proportion of married patients. The small number referred by the courts, employers or ministers is also unusual.

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THE VALUE OF NON-VERBAL COMMUNICATION IN PERSONALITY UNDERSTANDING

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In discussing the psychophysiological aspect and higher order of abstractions in humans in differentiation to animals, Korzybski (3) states: "It is obvious that the fundamental means which man possesses of extending his orders of abstractions indefinitely is conditioned, and consists in general in symbolism and, in particular, in *speech*. Words, considered as symbols for humans, provide us with endlessly flexible conditional semantic stimuli, which are just 'real' and effective for man as any other powerful stimulus."

I would like to refer to "language behavior" as the totality of a person's behavioral and semantic responses at the time he speaks in any one particular speaking situation. It can be understood mostly as a dynamic process in a totally integrated individual with expressive activity observable in his (overt) behavior, such as talking, walking, sleeping, etc., plus implicit behavior (subjectively experienced), including thinking, feeling, wishing, understanding. It is the awareness of these total integrated components in action in any given situation that give meaning and direction to his behavior.

In persons with conflicting tendencies leading ultimately to conflict, we usually discover associated distortions and emotional disturbances pertaining to the process of verbalization. An individual who feels basically divided experiences anxiety and psychic disintegration which simultaneously affect his organism as a whole. Unable to preserve enough of his "real self" to express clearly or directly the real intent of his thoughts and feelings, he becomes disorganized and reacts confusedly to this total environment. He is thus unable to abstract clearly or productively, with the resultant that objective reality situations become subjectively experienced with irrational fear and in abnormal proportion to their true evaluative perspective. Epictetus once said, "What disturbs and alarms man are not the things, but his opinions and fancies about the things." Finally, in the actual process of verbal communication, we will find that, instead of free-flowing spontaneous expression, a blocking, hesitant, and confused form of speech ensues. This latter word jargon with all of its neurotic attempts toward psychic-restoration (rationalization, compartmentalizing, externalizing, "bugaboo" words, distractions, etc.) includes a wide range of overt, anxious attempts on the part of the individual to remove disturbing subjective stimuli and conflicting tendencies at the time of conflict.

Consider the great deal of silent and hidden interplay of feelings, thoughts, and actions (either of a conjectured or comprehensive nature) which occurs between two or more persons in the subterranean communicative channels of language behavior. We relate a considerable portion of this data through conscious hearing, sight, touch and smell. A further portion is relayed to us in the process of intuition and through unconsciously felt perceptions. We communicate every minute of the day with others and the outside world through "speaking" gestures, peculiarities in gait and dress, a sense of touch while shaking hands, the mannerisms of another person's glance or looks, the condition and texture of his skin, the color of his eyes, his lips, his body build, and a multitude of similar bodily characteristics.

The minutest movements, states Theodor Reik (6), "accompany every process of thought; muscular twitchings in face or hands and movements of the eyes speak to us as well as words. No small power of communication is contained in a glance, a person's bearing, a bodily movement, a special way of breathing. Signals of subterranean motions and impulses are being sent silently to the region of everyday speech, gesture, and movement.

"A series of neurodynamic stimuli come to us from other people and play a part in producing our impressions, though we are not conscious of noticing them. There are certain

expressive movements that we understand, without our conscious perception really being at work in that understanding. We need only think of the wide field of language. Everybody has, in addition to the characteristics we know, certain vocal modulations that do not strike us; the particular pitch and timbre of his voice, his particular speech rhythm, which we do not consciously observe. There are variations of tone, pauses, and shifted accentuation, so slight that they never reach the limits of conscious observation, nevertheless betray a great deal to us about a person. A voice that we hear, though we do not see the speaker, may sometimes tell us more about him than if we were observing him. It is not the words spoken by the voice that are of importance, but what it tells us of the speaker. Its tone comes to be more important than what it says. 'Speak, in order that I may see you,' said Socrates.

"Language—and here I do not mean only the language of words but also the inarticulated sounds, the language of the eyes and gestures—was originally an instinctive utterance. It was not until a later stage that language developed from an undifferentiated whole to a means of communication. But throughout this and other changes it has remained true to its original function, which finds expression in the inflection of the voice, in the intonation, and in other characteristics. It is probable that the language of words was a late formation, taking the place of gesture language, and it is not irrational to suppose, as that somewhat self-willed linguist, Sir Richard Paget, maintains, that the movements of the tongue originally imitated our various actions. Even where language only serves the purpose of practical communication, we hear the accompanying sounds expressive of emotion, though we may not be aware of them."

Consider the multitude of bodily expressions and behavioral gestures which give insight and understanding to psychosomatic disease. In the symbolism of symptoms, the individual unable to find an outlet for tension of emotional origin either by word of action discovers instead a means of expressing these tensions through a kind of "organ language". Unable holistically to verbalize his feelings, thoughts, or actions, either to himself (intrapsychically) or to others (interpersonally); his organism as a whole becomes threatened and the struggle toward achieving psychic-unity, self-protectiveness, and pseudo-integration is crystallized in the manner of bodily responses.

Language of the body or organ language is astonishingly well described in everyday popular phrases. We speak, for example, of not being able to "swallow" an unpleasant life situation, an insult or belittling remark; frequently a feeling of oppression in the chest accompanied by sighing respirations in the absence of organic findings indicates that a person has a "load on his chest" that he would like to get rid of by talking about his dilemma. Nausea usually expressed symbolically in the words "can't stomach it" represents an attempt on the part of the inidividual to "vomit away" his difficulties. A common advice or warning to others who "burn up" or "explode with anger" is "don't get your blood pressure up, take it easy." Bodily expression in the form of fatigue is very often due to emotional conflict which uses up so much energy that little is left for constructive use. An ache in the arm may, for instance, symbolize a defensive action against striking at someone else. Itching with no organic basis often represents an attempt to "come alive" or self-inflicted contempt for not being able to idealize one's self. These and many other examples are indications in which the body has a peculiar language of its own through which it conveys feelings and meanings it is unable to verbalize or healthily abstract to higher and more productive bodily levels.

In hysteria, for example, we find a dramatic form of expression of language behavior. The hysterical person, for instance, when faced with an unbearable or unacceptable reality, unconciously avoids experiencing or perceiving the same situation by resorting to symptom formation. In the chaotic attempt to avoid feeling anxiety, and in order to "pull himself together" and restore some form of psychic unity, the hysterical individual externalizes all of disturbing situations, thoughts or feelings associated with anxiety to his body and to the outside and attempts to rise up into his imagination where he creates, in a sense, a "body-image" of his own. Hysterical speechlessness, for instance, may represent an

attempt to satisfy two conflicting drives of a particular speaking situation: the wish to assert one's self or express hostility openly, and the conflicting need to be accepted, loved and thought of as being "a nice one" by his listener. The result, as one can see, leads to a state of emotional and physical stress, inhibition, paralysis and blocking of the whole person—including that of verbalization.

Semantically speaking, the symbol *is not* the thing symbolized. It is also an obvious fact, in the process of verbalization, that words or labels represent conveniences and *are not* the objects or feelings themselves. As Korzybski (4) so clearly states, "we should carry the labels in our pockets, so to say, as we carry our money, or checks for hats or trunks, and not identify them 'emotionally' with what they eventually stand for, because monetary standards change, and hats and trunks get exchanged, lost or burnt. To accomplish this, we must have *objective levels*, which we may handle and carry in our pockets, and also an objective something to which we can attach the labels. . ."

What goes on in the non-verbal, silent or unspeakable levels in relation to life facts can only be differentiated in terms of our individual reactions, orientations, evaluations, etc. To begin with, whatever we perceive from our objective environment through the senses of sight, taste, smell or touch, is absolute in nature and *unspeakable*. For instance, if we take and handle an apple, we discover that the object *is not words* and that to react or arrive at some degree of evaluation, we cannot reach this level with *words alone*. To arrive at a level of awareness and realistic objectivity, we must of necessity handle, look, listen, remain silent, reflect and, in a sense, feel our way through. This "silence on the objective level" involves, to a large extent, checking many of our irrational feelings, preconceived notions, prejudices and dogmatic beliefs. Finally, what occurs is mainly an individual and personalized interpretation of an object, which is, in turn, verbalized and expressed in *one's own symbols and words*.

According to Korzybski (4), to begin with "our lives are lived *entirely* on the *un-speakable* level." We illustrate this constantly in our daily living activities such as sleeping, eating, walking, feelings, desires, pleasures and pain which *are not* words. If words are not translated into the first order un-speakable effects, with the result that we do not do something, or do not feel something, or do not learn or remember something, such words have *no effect* and become useless noises.

The problem is not being able to demonstrate the objective or unspeakable levels, in direct and absolute representations, is *not* necessarily one of inadequacy of words. We can always invent "adequate words", but even the most ideal and structurally adequate language will *not be* the things or feelings themselves. Distortions in verbalizations and language structure occur, in the main, in our reluctance to accept *what is*, and to create, because of our anxieties, conflicts and apprehensions, idealizations and magical identities with words and symbols. In our attempts to describe and verbalize our feelings, actions, beliefs and emotions as we feel they *should be* and not as they exist in *actual reality*, we of necessity are compelled to create and use a vocabulary of magic and imaginative identification, with definitely confused attitudes toward words and symbols.

To arrive at clearer understanding and the choice of a more productive language, we need more than "common sense"—which some time ago was defined by Stuart Chase as that which tells you that the world is flat. Since we live in a world where our manner of thinking and self-expression is strongly molded and influenced by such powerful mass media of communication as television, newspapers, the radio, advertising and magazines—we find little time or, in most situations, do not even care to become self-evaluative. To avoid semantic confusion, we must guard against taking what we hear from others (our teachers, preachers, politicians, salesmen, radio commentators, etc.) as being the "gospel truth". Finally, in this same context, it would prove beneficial in breaking down semantic barriers that: The symbol is *not* the thing symbolized; the word is *not* the thing; the map is *not* the territory for which it stands.

In the process of further clarification of language structure, we must stress the fact that words, as such, must be divided into two categories: a first, in the main, of

descriptive, functional words; and a second, of inferential words, which involve assumptions or inferences. For instance, let's take the statement, "John did not go to work this morning." As the comment stands, it is merely descriptive of an event which may or may not have happened to an individual known as John and is in relation to certain concomitants of time and space. If we later discover that John, for some reason or another, *refused* to go to work, then it still remains a descriptive statement, and we now have more definite information and evidence of his inner state of being. Without the latter data, that is without some cognizance of John's attitudes and feelings at the time of action, we are only led to make assumptions or inferences of the facts involved. This discrimination between descriptive and inferential words is not based on any "absolute" differences but, to a large extent, is variable and depends on the context.

An inference may be defined as a statement of the unknown made on the basis of the known. We may *infer*, for instance, from such cultural externals as the pretentiousness of a person's home, automobile, or clothes, his wealth or social position; we may *infer* from the noise of a human cry that a person is in some form of danger; we may *infer* from a man's bodily configuration the nature of his work; we may *infer* from a senator's vote on an economic bill his attitude toward small or large business. These same inferences may be made on the basis of a wealth of previous experience with the subject matter, or of no experience at all. For example, the inferences the trained psychiatrist makes about the prognosis of a person's state of mental health are much more accurate and to the truth than those inferences made by the so-called "parlor analyst", who may base his facts on hearsay and irrational deductions. In short, inferences are generally statements about matters which are not directly known to the conscious mind, made on the basis of what has previously been observed, felt or experienced.

In the process of evaluating ourselves and our relationships to the world about us, we tend to rely on *words rather than facts*. The healthier and the more aware a person is, the more accurate a map he creates of himself, and the more he "knows himself", as *he is* and not as he feels he *should be*. However, to repeat, a map *is not* the territory; one's self-concept *is not* one's self. A map can never represent *all* of its territory; one's self-evaluation in and of itself *omits* certain details of one's actual self—we never know ourselves *completely*. Maps of maps of maps, and so on, can be made: one may describe oneself to oneself, and then make about oneself *any number of inferences and generalizations at higher levels of abstraction* (1).

In relating to others and in the use of our language when speaking, we express our opinions, feelings, beliefs or awareness to the degree to which our thoughts or statements are projective representations of our own inner state of being, at the particular time of expression. This process in itself is variable, flexible and is in dynamic change, from person to person, object to object, and situation to situation. Finally, in our verbal statements, we report facts in the main as they appear *to us*, in relation to our inner condition at the time, by such words as "it seems to me", "from my point of view", "as I see it, it appears thus and thus", etc. For convenience, then, we may refer to consciousness of projection as *to-me-ness* (2).

We are plagued many times today, in our everyday use of language, by the use of *is* as though it were an identity of actuality. The problem, however, is not so much one of revising the language or of eliminating some of the words since our language is so predominantly an *is* language that it would be practically impossible to speak without using the various forms of *to be*. More important is the developing of a keen awareness of projection and the developing of the consciousness that this "is" breeds false-to-fact evaluation. It would prove helpful, in order to minimize verbal confusions and daily disevaluations, to attempt to replace the use of the word *is* by such relative terms as seems, appears, looks like, may be, etc., whenever possible and to indicate to-me-ness by such expressions as "in my judgment", "in my opinion", "from where I stand", "from my particular point of view", and similarly. "But the essential thing," emphasizes Johnson (2), "is *awareness* of projection. We need not always, by any means, express this awareness in so many words out loud or in writing. We can say,

'It is a blue curtain,' or 'It is art,' and know quite clearly what we are doing."

The mechanism of unconscious projection in our everyday language can prove to have some adverse consequences unless we are consciously aware of its process. One of its first consequences is that of making judgments about "things". "Observers," writes Lee (5), "who do not know that the adjective 'is' represents projection tend to rigid and inflexible behavior on the assumption that the 'qualities' are in the object, and obviously 'what is seen is seen'. If other observers are unable to see the 'same' as I do, then they must *be* perverse, blind, or simply dumb. That is, if 'beauty' or 'ugliness' or 'hardness' or 'difficulty' (or any other 'quality') exists in 'things', and if they are apparent to me, why do others not see and praise them my way? Of course, the argument is phrased more subtly, but the effect is similar. And invariably, investigation of some of the assumptions of the speaker reveals that he or she ends with, 'Well, it *is* beautiful,' quite unmindful that the inside impressions only are being described. . ."

In the use of judgments, the speaker, consciously or unconsciously, projects his own inner feelings, beliefs or thoughts of approval or disapproval of the occurrences, persons, or objects he is describing. For example, in the statements, "John is a *liar*", "Jack is *cunning*", 'Frank is *intelligent*", we imply that the comment as such "to be" or "is" a "fact". We express in such verbal communications a projection of that which is "within ourselves", and accept it as though it were a truthful and meaningful report without too much concern for the external observation of facts or its scientific verifiability.

Still another consequence of "unconscious projection" is the pitfall in language which occurs when impressions between different observers differ, not so much in relation to the facts at hand, but because of the use of different variable adjectives. For instance, the questions: "Was Jack Dempsey the greatest of champions or merely a good boxer in his prime and day?" "Which is the best form of relaxation, reading, golf, movies, tennis or radio?" or "Could Willy Mays outhit Ty Cobb in his prime?"—are usually aimless and fruitless to discuss or debate. When this happens, verbal interchange between people leads to little productivity, with no settlement of the question, and with a great deal of emotional interplay which has very little connection with the issue at hand. If the insistence on "splitting hairs" persists, more and more superlative adjectives tend to be injected into the discussion, less and less agreements occur—finally leading to confusion and discord. If we could listen more (without prejudice, criticism or condemnation) and argue less (without flared up emotions and fixed opinions of our own), we might then be able to communicate with each other with more meaningful purpose. The end result would also be one in which we may leave the discussion slightly better informed, slightly more aware of things, and slightly less one-sided and dogmatic than we were before the conversation began.

A second manner in which we might be able to avoid having conflicting issues in a discussion become an argument is to move the talk from the level of judgment-making to more descriptive levels. In other words, instead of attempting to debate the issue of whether Ty Cobb or Willy Mays is the better hitter or fielder, it would prove more constructive to discuss at length the individual qualities, attributes or accomplished actions of either one or both the players involved. Using these extensional facts as a basis for further discussion, levels of agreement are more easily achieved, genuine understanding more easily reached, and the continuation of talk on healthier planes of evaluation is more readily accessible.

Summary

In order to communicate with more purpose and meaning, we of necessity should tend toward a language which is productive and understandable to both the "speaker" and the "listener". An organism which is in conflict and tends toward psychic disorganization and the formation of anxiety will concomitantly express this state of disturbance in all areas of personality, including that of verbalization. Disturbances in communication are not only expressed in terms of the spoken or written word, but in all the interplay of hidden gestures, feelings, bodily reactions,

glances, etc., which are constantly going on in dynamic human beings. An awareness of both verbal and non-verbal factors is essential in order to arrive at a more complete understanding of human behavior.

Finally, something cannot exist as something else. The symbol is not the thing symbolized; neither is an object a word. In the process of evaluating ourselves and the relationship to the world about us, we unconsciously tend to project onto words rather than facts. The healthier and the more aware a person is, the more accurate a map he creates of himself, and the more realistically he sees himself, the more will he be able to verbalize facts, situations or feelings as *they are* and not as they *should be*. In conclusion, with our language as it is, we can only make verbal statements and report facts in the main as they appear *to us*, in relation *to our inner condition at the time*, and with variable terms such as "it seems to me", "from my point of view", "as I see it", "it appears thus and thus", etc.

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SOME DYNAMICS OF DELINQUENT GIRLS

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In this brief communication I would like to make some remarks about a particular segment within the total problem of adolescent delinquents. We have seen, in the last year, three girls who represent a particular pattern of delinquency. This pattern is widespread and well known.

The girls are in their early teens (13 to 16). They come from deprived backgrounds which have included economic wants and the absence of the father. In their delinquency, they present a well-defined syndrome.

The girls belong to gangs of mixed sex. Within the gangs, they pair off one girl to one boy, although the pairs are sometimes not very permanent. They wear a gang uniform, sometimes blue jeans, a particular kind of moccasin, sometimes a certain belt, costumes composed of black shirt and black slacks. They exhibit gang symbols in the forms of scarred or tattooed patterns on their bodies. These patterns are the initials of the gang, the initials of the boy friend, or a symbol which is taken by the gang and which may include extra marks for prestige earned within the gang, sometimes symbols, the meaning of which cannot be found out. The marks are made on parts of the body which are usually exposed, that is, the face, hands, forearms or legs. The girls carry weapons. The weapons are of two kinds. One kind is generally lethal, such as switch knives and zip guns. They carry these not to use themselves, but for the use of the boy friend, the girls' duty being to take upon themselves the risk involved in carrying concealed weapons, to pass these weapons to their boy friend at times of fights, and to receive the weapons back again as soon as the fight is over. The second kind of weapon is carried by the girls for their own use. These are weapons which are intended to wound the opponent but are not lethal. Examples are sharpened nail files, razor blades with little wooden handles, beer can openers specially sharpened, and large pieces of costume jewelry one edge of which is sharpened to a cutting edge. It may also be mentioned that the second kind of weapon is almost never really used although extremely often referred to and fairly often used as threats.

There is a particular sexual pattern among these girls. Most of them have had intercourse, some of them have been prostitutes. The sexuality, however, is definitely not for the sake of the physical and emotional pleasures. It is done primarily as a demonstration by the girls that they are not afraid. In fact, they are extremely afraid of intercourse. The fear is presented first in conscious reality terms, that is, fear of pregnancy and venereal disease, but very soon and fairly easily, in terms of extremely strong guilt. They tell of fear of being unable to have children, fear of being made unlovable by "good men," and fear of divine punishment.

In many gangs which I have heard about and in the three girls whom I have studied with some degree of intensity, alcohol and marijuana are made use of. It is a particular sign of prestige among the boys and girls to peddle marijuana. These girls have had a fair amount of experience with marijuana intoxication and with advanced degrees of drunkenness. Very occasionally alcohol is used as a sedative for anxiety and fear as before a fight or a sexual orgy. Much more frequently, however, the alcohol is drunk, usually as beer and wine, and the marijuana is smoked as a demonstration of courage. These girls do not apparently derive any pleasure from either alcohol or marijuana. They are often nauseated and even sick, almost from the beginning of the intake and for days afterwards. Part of the demonstration of their courage in this area is to talk at considerable length in a bragging way about how sick they were, how bad the headache was, how often they vomited, how many days it was before they could eat food again. Among the other forms of physical danger to which they often resort is driving automobiles dangerously.

These girls take considerable pleasure in

spending all available time in the hangouts of their gangs. These are generally places of a disreputable nature, where the gang is particularly well regarded and given special privileges such as credit or refuge when they are being sought by some enemy. Complicated social rituals are built up in these hangouts.

The girls attempt to conceal most evidences of their femininity. Young girls, who talk with complete freedom about promiscuity, prostitution, the use of drugs, being in jail, etc., become reticent and extremely embarrassed when questioned about menstruation. They do not use the usual terms of reference to menstruation for girls of their age. When forced to refer to menstruation they use complicated circumlocutions. One girl invariably referred to beginning menstruation as "I fell off the roof". Another girl never used any term other than "it". The third girl simply became mute and refused to talk whenever menstruation was brought up. They prefer trousers to dresses and wear their hair extremely short. They use nick names which can be either masculine or feminine. They actually compete with the boys in their gang in a masculine way, sometimes fighting them physically. It is considered a particularly great triumph for a girl, a particularly great shame for the boy, when the girl wins such a fight. Winning is generally forcing the opponent to give up, that is, to burst into tears, to run away, or to ask for mercy. When girls take part in these fights with members of their own gang, no weapons are used, and the fight is conducted in a masculine way, mainly punching and with no hair pulling or scratching. A favorite game is exchanging punches. A girl and boy take turns punching each other, usually on the upper arm, to see which will give up first. These girls express great scorn of ordinary girls ("squares") who curl their hair, wear dresses, high heels, and more or less obey their parents.

An exception to the denial of femininity is seen in the exhibition of the breasts and buttocks. This exhibition is indirect. The delinquent girls have what seems to me a normal degree of modesty during physical examination and describe avoiding nudity even during sexual activity. On the other hand, they wear extremely tight sweaters, with exaggerated brassieres, padded if necessary, and extremely tight trousers. In the case of blue jeans, an accepted way of getting them to fit properly is to put them on, sit in the bath tub until they are thoroughly wet, thereafter wear them until they dry.

Further exception to the denial of femininity is seen in the fantasy held by all three of the girls studied and I believe commonly by others in this group, of normal married life. This generally is fully conscious and easily elicited. Among my three patients, every new relationship to a boy is attended by reactivation of this fantasy. There is invariably in each new relationship a period of quietness during which the girl is attracted to the boy because he is kind to her, because he makes no passes, is not fresh, because he protects her from others and because he says he wants to share with her or does not damage her fantasy that this is "true love" which will eventually lead to normal marriage.

It should also be added that in the future development of these sexual relationships, an agreement is soon reached that the normal marriage must be postponed for urgent and compelling present reasons. They cannot marry now because of their youth, because of lack of understanding of parents, because of persecution by police and welfare agencies, and they are, therefore, justified in having premarital relationships. They need money for their regular recreations, indeed sometimes to pay for food, clothing and lodging since they are often cut off from their families. This need for money, in the presence of society or family or parents, who are perceived as hostile and unsympathetic, justifies theft, prostitution, and peddling marijuana.

A presenting and invariable phenomenon seen in these children is the group-shared counterphobic defense. There is almost a categorical imperative with them that no dare may be refused, that no dangerous task or unpleasant beverage be refused. After their confidence has been won, they communicate, in a way which arouses pity and even some respect, the horror and revulsion they feel for certain of the actions imposed upon them by other members of the club, who challenge their courage. Such dares may be fights either between individuals or between groups,

drinking particularly unpleasant alcoholic beverages, performing sexual perversions or indulging in assembly line sexuality. In one case, it was a frequent practice that a girl member of the gang, challenged, would have intercourse with all present boys of the gang, the number of boys usually being 10 or 12. In spite of the extremely strong negative feelings which the girls feel about such things, they have a greater fear of being laughed at, excluded and ridiculed by the other members of the gang for their lack of courage for being "chicken".

Depending upon this social symptomatology among certain delinquent girls, I would now like to suggest a genetic and dynamic formulation of etiology. I must emphasize that none of my three patients was analyzed to a logical conclusion, and, therefore, these dynamics must be considered tentative with no generalization intended.

The girls have all, at least for some years, lived with mothers who were beset by many difficulties. These mothers were mistreated or deserted by their husbands, they were poverty stricken, and they generally were complaining and bitter about bearing and bringing up children. Furthermore, in every case, these girls had no practical experience with fathers or father figures in their early lives. It is of particular note that these girls could tell me almost nothing about their fathers, even secondhand. In other words, their mothers neither praised nor blamed their father. In fact, they avoided any mention of the fathers.

In this living situation, there develops in these girls a concept of women, and particularly socially conforming women, as inevitably suffering and failing to make any attempt to terminate their suffering. This is the concept symbolized by the high cathected and overdetermined word "square". A "square" to the delinquent is a person who accepts the requirements of moral civilization thereby depriving herself of all pleasures. These girls have two separate concepts of men. One is of the ordinary man, who is also a "square", not at all to be admired or imitated. The other is a concept of a minority of men who by their personal courage are able to defy the ordinary rules of conduct and thereby earn happy and exciting lives. It is of particular interest that the courage of a war-time hero or the courage of a socially accepted daredevil is not admired. The courage has to be evidenced in breaking the law, in social defiance.

It goes without saying that in addition to these rather unusual contents, the psychologies of these girls contain also many other ego-ideals and the usual superegos. During psychotherapy all three of these girls had repeated periods of pious morality during which they not only behaved correctly themselves, but were very indignant over the misbehavior of others. The episodes to which I refer here are not the same as other episodes in which the delinquent attempts to deceive the doctor by acting as if she were convinced of the advantages of social conformity. I offer the hypothesis that these delinquents act out the role of the male swashbuckler with their extremely advanced evaluation of defiant courage as the most admired of all human traits. It is true that certain aspects of their behavior seems feminine: they pair off with boys and they play a pseudo-feminine role in sexuality. These things, however, are of very much less psychological and emotional importance to the girls than are the more masculine aspects of their roles, in particular their almost total refusal to admit feeling fear or to accept passive defeat.

Among the three patients being described here, there was particularly marked fear of homosexuality. The girls were fairly familiar on a verbal level with homosexual practices. All three of them had taken severe and repeated beatings in institutions rather than take part in homosexual practices. Two of them, toward the end of their stay in the hospital, talked at some length about their fear of homosexuality if they were sent to girls' institutions, and both expressed the idea that it was impossible for a girl indefinitely to resist the seductive maneuvers of female homosexuals.

The masculine identification described above would justify the assumption that unconsciously these girls think of themselves as boys, with boys' social prerogatives and male genitals. As is usual in such cases, there must be a series of compromises between demands of the very strong masculine identification and

other weaker feminine identifications supported by normal female physiology. The masculine identification is thus acted out by overevaluation of defined physical courage, by using weapons, and by exhibiting scars and tattoos. The acting out and symbolization of the masculine identification aid in the maintenance of its repression.

The progress of therapy in these cases can be seen partially in terms of the conflict between a particular ego-ideal, masculine, homosexual, antisocial, etc., on the one hand, and other more acceptable ego ideals supported by superego activity, on the other hand. Progress in therapy is most difficult to evaluate, for the reasons that these girls as a rule are unable to communicate verbally about their emotions. Their psychological status has to be read partially from their behavior, which they act out so vividly, and partially from dreams and other productions.

Not infrequently, emotional changes will be denied. For example, one delinquent girl was carefully obeying all ward rules, carefully avoiding her usual delinquent companions, attending church very often and having phantasies of being a nun. During this period, however, she confessed (completely untruthfully) to me and to her nurse, a long series of the wildest antisocial activities.

A large part of the therapist's job, of course, is to support the socialized forces or ego and to weaken the antisocial ones. The evidence which is adduced to attack antisocial behavior must be based exclusively on pleasure-pain. It is destructive to future psychotherapy for the therapist to introduce any evidence which has as its base morality, religion, or philosophical principles. These children are willing to deal only in very empirical data, clearly evidenced at the present moment.

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RESTORATION BY HYPNOTHERAPY OF A LOSS OF THE SENSE OF TASTE OF 4½ YEARS' DURATION

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The average person spends far more money for the purpose of appeasing his gustatory sense than for maintaining the integrity of and/or gratifying his other four special senses combined.

Syringomyelia with its sequential loss of touch is a neurological curiosity, but is occasionally seen. Cases of hysterical blindness occur frequently enough that they are readily and accurately diagnosed by competent ophthalmologists. Otorhinolaryngologists record cases of hysterical deafness and/or anosmia with a fair degree of regularity. But a disturbance or absence of the sense of taste is a very infrequent symptom. The sense of taste is so inherently interlaced with the sense of smell that when a taste dysfunction is averred by a patient, it is usually the sense of smell which is culpable rather than the sense of taste (4).

Four basic tastes are recognized, viz: Sweet, sour (acid), salt, and bitter (2). Some authors add alkaline and metallic (3). The vallate papillae on the surface of the posterior portion of the tongue are the receptor organs for bitter taste. Sweet tastes are perceived on the surface of the tongue anterior to that portion on which these vallate papillae are located. Sour taste is perceived on the surface and edges of the anterior third of the tongue. There is thus an overlapping of the receptors for sweet and sour tastes over the surface of the anterior third of the tongue. Salty tastes are perceived on the edges (margins) of the anterior three-fourths of the tongue (11). A substance must be in solution, even though the solvent be the saliva, in order that it may be tasted (4). A solid substance on a dry tongue cannot be tasted (2, 11).

Receptor taste fibers for the anterior two-thirds of the tongue are supplied by the Chorda Tympani Nerve, which is a sensory component of a branch of the Facial (7th Cranial) Nerve (10). Taste receptors from the posterior one-third of the tongue are borne cephalward through the Glossopharyngeal (9th Cranial) Nerve. The fibers of these two components of receptor gustatory sensations join in the Nervus Intermedius of Wrisberg (7). The pathway for taste impulses is continued by tertiary neurons to the cortex of the hippocampal gyrus in the region of the uncus (8). Proprioceptors for substances in contact with the inferior surface of the tongue derive from the Vagus (10th Cranial) Nerve (4). The sensations perceived by these fibers have to do more with size, shape, and consistency of the substance rather than its taste. There fibers terminate in the lower extremity of the tractus solitarius (3). The Trigeminal (5th Cranial) Nerve contains no taste receptor components (7).

The Chorda Tympani carries dilator fibers to the blood vessels of the sublingual gland. Stimulation of the Chorda Tympani excites the secretory functions of the parotid gland and results in a copious discharge of saliva therefrom. By use of a manometer, it has been ascertained that under these conditions the pressure in the parotid gland exceeds the pressure in the carotid artery (3).

It is theoretically possible for an organic bilateral palsy of the Nerves of Wrisberg to produce a loss of the sense of taste. However, it is quite unlikely that an equally distributed palsy of these nerves would be found in the clinically evident absence of palsies of peripheral nerves elsewhere in the body, if underlying organic pathology were etiologically responsible for the disturbance in gustatory sensation.

It has been shown that temporal lobe lesions may produce alterations in the sense of taste; or, as frequently occurs with such lesions, there are complaints of unpleasant taste hallucinations (3). Hippocampal stimuli produce discharges unilaterally and equally if identical stimuli are applied to both sides (6). It is hardly conceivable that a lesion could exist which would equally involve both the right and left hippocampal gyri without neurological manifestations other than an aberration in the sense of taste.

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Case Report

Mrs. LMC was 42 years of age at the time she first became aware of the almost complete absence of her sense of taste. The onset of this symptom was rather abrupt. She had undergone an ordinary acute coryza of average severity which is so frequently accompanied by a temporary diminution in taste sensations. But Mrs. LMC's sensation of taste did not return after the acute coryza had subsided. Prior to the onset of this loss of her taste sensation, her pertinent medical history is as follows:

Smallpox during her late teens. No disfiguring scars. Appendectomy at age 20. Uneventful recovery. Tonsillectomy at age 22. Uneventful recovery. Gastric ulcer during her late 20's. Recovery, without recurrence up to the present time.

Fracture of a rib incurred while housecleaning at age 40. Uneventful recovery. No other consequential injury during her entire lifetime.

Menstrual and Marital History:

Menarch at age 12. Menses regular and without dysmenorrhea even to present time (at age 47).

Married at age 32. Three children—all in excellent health. No pregnancies which did not eventuate in spontaneous birth of full-term viable children.

The complete loss of Mrs. LMC's sense of taste had persisted without abatement for 4½ years at the time she first came under the observation of the dentist co-author. She had been seen by an outstanding ophthalmologist on three occasions at intervals several months apart. On none of these occasions did he elicit any findings indicative of an intracranial tumor. A well-known neurosurgeon was likewise unable to establish organicity which would account for the bizarre symptom. A nationally-known otolaryngologist ascribed the site of the lesion to an idiopathic affection of the Chorda Tympani Nerves but offered nothing for alleviation of the distressing symptom. An allergist of professorial rank as a faculty member of a famous medical college prepared desensitizing extracts in gradually increasing strengths. Mrs. LMC received injections of these extracts regularly over a period greater than one year without obtaining any improvement. The physician co-author was cognizant that the correct diagnosis was bilateral hysterical paralysis of the Nerves of Wrisberg. He had administered a series of insulin subcoma treatments (1, 9), but this effort was likewise totally ineffectual in evoking any improvement in her symptomatology. The physician co-author had attempted hypnosis; but for some reason (probably because the patient was a close relative), had failed to obtain even a light trance. This physician suggested consultation with the dentist co-author and urged his dental colleague to utilize whatsoever methods he might have at his disposal for correction of this troublesome malady.

At the time this patient consulted the dentist co-author, abnormal dental findings or needs for dental care were nil. As a matter of fact, this lady appeared to be in excellent general health. She stated that insofar as her perception of taste was concerned, she could not, for example, distinguish cake from bread; but that by eating a known sweet food, a definite increase in the flow of saliva ensued. This salivation likewise followed ingestion of substances which were characterized by dominance of either salt, sour, or bitter tastes (3). She furthermore stated that coffee and/or tea, which she had formerly relished, would produce excessive salivation for a period of even several hours.

The co-author (dentist) had previously hypnotized this patient on the day just before the consultation mentioned above. On that occasion she had volunteered as a subject for demonstration before a group at a seminar on hypnosis. On the occasion of this first successful attempt at hypnosis, the co-author (dentist) was not cognizant of her absence of gustatory sensation. In contrast to the physician's previously unsuccessful attempts at hypnosis, on the occasion of the formal consultation with the dentist co-author, the patient entered a satisfactory trance state quite readily. Without further ado, the already fairly deep trance state was further deepened. By utilizing an age regression technique, Mrs. LMC was regressed to conditions as they were when her chronologic age was 35 years. In the trance state she was requested to hallucinate a table loaded with delicacies, each of which she sampled, identified, and relished. She then requested coffee and tea with these delectable pastries which she (in her phantasy) drank with gusto. The expression on her face was that of joyous satisfaction and serene placidity. Suggestions were then given to the patient that if she really de-

sired it, she could retain a normal sense of taste post-hypnotically. No attempts were made to explore causal factors. The entire hypnotherapeutic procedure was accomplished on a permissive basis rather than on a domineering or coercive vantage-ground. Functional symptoms removed by suggestion on a permissive basis are not likely to recur. Such an approach also minimizes the likelihood of symptom substitution (5).

The dentist co-author took this patient (and also her husband) to dinner immediately after she was brought out of the hypnotic trance state. For the first time in many months, she drank coffee without the troublesome salivation and enjoyed a generous serving of a sweet dessert.

The physician co-author deposes that this patient's sense of taste has continued normally since May 20, 1955, the date of the single hypnotherapeutic procedure, up until the date of this case report on January 3, 1956.

Summary

1. Basic neuroanatomic and neurophysiologic aspects of gustatory sensation are reviewed.

2. Case report of loss of sense of taste of 4½ years' duration due to bilateral hysterical paralysis of Nerves of Wrisberg is cited.

3. After other methods of treatment had failed to alleviate this bizarre and unusual symptom (loss of sense of taste), restoration of gustatory sensation through a single hypnotherapeutic procedure is explicated.

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AN IMPROVED ORAL PROTECTIVE DEVICE FOR USE IN ELECTRO-CONVULSIVE THERAPY[1]

DANIEL MILLER, M.D.,[2] AND HAROLD SABIN, B.A., D.D.S.[3]

The prevention of injury to the soft tissues of the mouth and lips during the seizure of electroconvulsive therapy presents technical difficulties. The possibility of respiratory emergencies requires the maintenance of a free approach to the oral cavity and pharynx throughout treatment so that resuscitative measures such as administration of oxygen under pressure will not be hindered.

Several improvised and commercially manufactured appliances were tried for this purpose

FIG. 1. Appliance and rubber airway

but proved to be unsatisfactory. This led to the development of the relatively simple and practical device described below. A review of other appliances in use is not within the scope of this report.

The device consists essentially of two rubber bite blocks which are held together by a curved metal bar that rests just labially to the lower anterior teeth. A serrated metal handle is attached to the mid-line of the curved bar by a shank that covers the mid-portion of the lower lip. The serrated handle is curved to roughly follow the contour of the lower lip (figures 1 and 2).

Figure 3 demonstrates how a rubber airway can be placed through the oral opening. It will also be noted that the handle does not project so far out of the mouth as to interfere with the placement of an inhalator mask.

The appliance has the following advantages:

1. The occurrence of injuries to the tongue and lips is far less frequent than previously.

FIG. 2. Appliance held in patient's mouth

2. Free access and visualization of the pharynx are maintained with the appliance in place so that suction can be applied without interference.

3. Airway is not obstructed because there is no tendency to displace the tongue posteriorly.

4. If desired, a rubber airway can be inserted to insure unobstructed respiration.

5. The handle of the appliance is so constructed that it does not interfere with the application of the resuscitation apparatus and the mask can be fully approximated to the face to maintain a pressure seal.

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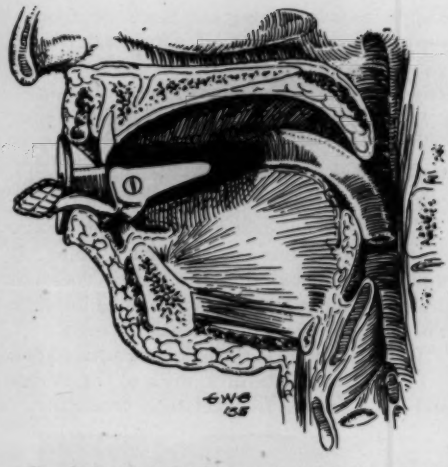

FIG. 3. Sagittal phantom section of the head with the appliance and airway in place.

6. Nursing personnel assisting in electroconvulsive therapy not only learn to place and use the appliance readily, but accept it with greater confidence than any of the previous appliances used. Risk of injury to fingers of the assistant holding the appliance is eliminated.

7. One standard size is suitable for all adult cases. The appliance, however, is not intended for use in edentulous patients.

It is possible that further experience with this appliance may prove it to be useful in the respiratory management of comatose patients in other situations such as status epilepticus or insulin coma therapy.

The authors wish to acknowledge the technical assistance of Dental Technicians, Sidney Weinstein and Robert Forman, in the planning and fabrication of the appliance.

SOCIETY PROCEEDINGS

NEW YORK ACADEMY OF MEDICINE, SECTION ON NEUROLOGY AND PSYCHIATRY, AND THE NEW YORK NEUROLOGICAL SOCIETY

Joint Meeting, February 14, 1956

Joseph W. Owen, M.D., Chairman, Section on Neurology and Psychiatry, presiding

METABOLIC ALTERATIONS FOLLOWING CRANIOCEREBRAL TRAUMA IN THE HUMAN. DR. ALBERT W. COOK AND DR. E. JEFFERSON BROWDER.

The manifold issues involved in any single instance of severe craniocerebral trauma are still not capable of resolution. Patients at times presenting similar clinical features may on one hand succumb, others survive with neurological deficit, and a few exhibit complete functional recovery. Evacuation of an intracranial clot in some may not favorably alter a downhill course; however, in other seemingly comparable situations a disastrous situation is completely reversed by appropriate surgery. Lesions observed at postmortem examinations may also fail to resolve all pertinent issues.

In view of the persistent unsatisfactory understanding of these problems information was sought concerning metabolic alterations in patients with various degrees of craniocerebral trauma. Of particular interest were those patients clinically categorized as severe craniocerebral trauma and in this group all those who had died received more critical evaluation. The patients with mild and moderate head injury as well as those who survived with severe craniocerebral injury served as control groups when an estimation of factors leading to death was made. In this regard there were two principal features: 1. Disturbances in acid base balance. 2. Alterations in respiratory cycle.

Twenty-nine patients were studied. There were 18 patients with severe craniocerebral trauma and 11 with mild and moderate head injuries. In each, careful note was made of the type and character of respiration, and acid base studies included daily determination of the blood pH, carbon dioxide content, plasma bicarbonate, blood urea, hematocrit and various electrolytes in the blood. In the severe head injury group (18) 5 patients survived. In each of these there was no alteration of the acid base mechanism or the respiratory cycle. The remaining patients who had suffered severe craniocerebral injury all died and all manifested varying degrees of change in the respiratory mechanism as well as severe alteration in the acid base balance. The primary prevailing disturbance was that of acidosis, respiratory, metabolic or mixed. In those patients with elements of metabolic acidosis nitrogenous retention of a marked degree was evident. The change in pH at times was of a character that understandably was completely incompatible with life. In the group of mild and moderate head injuries without associated intracranial clots there were no deaths and in no instances were there irreversible respiratory or metabolic changes.

It is apparent that in patients with severe craniocerebral injury associated with alterations of the respiratory mechanism and ventilatory capacity that severe metabolic disturbances, namely uncompensated acidosis of all types, is a common factor. A single feature that distinguishes those instances which result in fatal issues from those in which survival is evident is that of the presence or absence of respiratory alterations and attendant uncompensated changes in the acid base balance.

Discussion.—DR. THOMAS I. HOEN: When Dr. Cook asked me to discuss this paper, I came up here with some trepidation, since I feel that the explanation of these phenomena is in the province of the neurophysiologist. In lieu of an explanation I shall simply make some comments. As you know, respiration is, in the simplest term, a reflex mechanism, although it is a complicated reflex. It is stimulated in two main ways, one by an excess of CO_2 in the blood, which affects the respiratory center, and one by a deficiency of oxygen, acting through the carotid sinus mechanism. The reflex functions in this way under normal circumstances.

The reflex can be interfered with, however, under pathological conditions, in a number of ways. I would say that these ways are primarily in the order of three: one by anatomic destruction of the center, which we encounter in all types of head injury; secondly, we know that while an increase in the CO_2 of the blood acts as a stimulus to respiration, we also know that an excessive increase in the CO_2 of the blood will paralyze the reflex center and act as a depressant. (This occurred in the case he referred to with the air way obstruction.) Thirdly, we know that a change in the pH of the blood, whether due to the respiratory mechanism or to metabolic disturbances, may paralyze the reflex center. In other words, a great increase in acidemia of the blood is toxic to the reflex center in a way similar to the action of morphine and other drugs.

I am a little disappointed that body temperature was not mentioned, because we have found that in similar cases it directly affects the respiratory mechanism. An obvious reason for it is that increasing body temperature greatly increases oxygen demand; at a temperature of 105° the oxygen consumption is increased 40 to 50 per cent, so that even with an increased oxygen uptake there may still be an oxygen lack. Also a distinction should be made between anoxia and ischemia of the respiratory center.

PERSONALITY FACTORS INFLUENCING RORSCHACH RESPONSES IN ORGANIC BRAIN DISEASE. ROBERT L.

KAHN, PH.D., DR. LOUIS LINN, AND DR. EDWIN A. WEINSTEIN.

Efforts to establish Rorschach criteria diagnostic of brain disease have been unsuccessful to date. Marked variations are found when different criteria are applied to the same population, or when the same criteria are tested on different populations. It is considered naive to assume that organic brain disease is an entity which will lead to one particular type of behavioral change. More consistent with the facts is the assumption that the behavior of a given patient is due to the interaction of a number of factors. In the present study the influence of the pre-morbid personality on Rorschach responses was investigated. The records of 22 patients with brain disease were studied. All showed such patterns of behavior characteristic of altered brain function as disorientation for time and place, reduplicative delusions and paraphasic language changes. All had diffuse or bilateral electroencephalographic abnormalities. The patients were divided into two groups according to the presence or absence of explicit verbal denial of illness (anosognosia). Since previous studies had demonstrated a relationship between explicit denial and a particular type of premorbid personality, this division of the patients provided a means of studying the effect of different personality patterns. The results showed marked differences between the two groups. The patients with explicit verbal denial gave significantly fewer movement, shading, color, small detail and total number of responses, while giving a significantly larger percentage of form and animal responses. These differences correspond to differences in the pattern of premorbid personality found on interviews with members of the family. The results of this study are considered a further indication that the Rorschach can have only limited usefulness as a diagnostic tool for brain disease when applied mechanically according to an arbitrary set of criteria or signs.

Discussion.—FRED BROWN, PH.D.: In this paper we are treated to challenging hypotheses concerning the usefulness of the Rorschach as a diagnostic tool in detection of brain disease, and have been shown that premorbid personality structure is a crucial differentiating factor in determining the Rorschach patterning and in accounting for the wide range of configurations encountered in this area, a range which has caused some psychodiagnosticians to throw up their hands in complete and frustrated surrender.

Quite apart from the basic hypothesis and its far-reaching implications, it is important to note that the writers make no conclusive comment with regard to the use of the Rorschach as a diagnostic device for detection of brain pathology. They state that it has limited usefulness as a diagnostic tool for brain disease when applied mechanically according to an arbitrary set of criteria or signs. Does this mean that there is a less mechanical and more dynamic way of using the Rorschach for this purpose? Certainly there is no intention of offering the patterns presented on the slides as a guide.

DR LOUIS LINN: Many years ago it became apparent that the Rorschach, by itself, was not a reliable test of organic brain disease. At times the test was helpful, other times it was not. There seemed to be no way of understanding its variability until the work of Weinstein and Kahn suggested the idea of separating our records into two groups, patients with anosognosia (explicit verbal denial of illness), and patients without anosognosia. As soon as we did that it immediately became clear that the anosognosic group showed Piotrowski's signs of organic brain disease and the non-anosognosic group did not. In retrospect it seems extraordinary that a consideration of premorbid personality factors should have been omitted from the analysis of Rorschach records of patients with organic brain disease, since the Rorschach is above all a test of personality.

Dr. Brown questioned the extent to which our records reflected basic personality and the extent to which it reflected the organic disturbance per se. In a few cases we were able to repeat the Rorschach test after the pathological brain process had improved and the disturbance of consciousness was no longer present. In these instances there was relatively little change in the pattern of the Rorschach responses, so that we felt even more justified in concluding that the Rorschach differences we saw reflected most of all differences in basic personality.

It should be emphasized that psychological studies are important in the diagnosis of organic brain disease. However, it is ill-advised to rely exclusively, or too heavily, on the Rorschach test by itself.

THE ABUSE OF THE PSYCHOLOGICAL IN CLINICAL PSYCHIATRY. DR. GREGORY ZILBOORG.

The fact that ours is a psychological age is incontestable. Yet there are signs that a considerable change is taking place in the character of this psychological age. During approximately the last decade and a half we seem to have shifted away from "pure psychology" and have drifted imperceptibly but relentlessly into a form of pharmaceutic interference with clinical conditions.

Important and instructive as the historical parallel of the use of tranquilizing drugs some 140 years ago may be, we are not as devoid of psychological insight into the problems of our patients as, for instance, Heinroth and Reil were, when they relied so much on the tranquilizing drugs of their day.

I am not an opponent of the use of certain modern drugs, but opposed to coupling their usage with the idea that they are adjuvants to psychotherapy. It is from this point of view that I consider that psychology is abused if it is made to fit our psychotherapeutic wishes in the light of our medicamentous propensities. As the awareness of this becomes greater and clearer, the main trends of medical history cannot help but reassert themselves and reinstate the value and the autonomy of the human individual. Throughout the ages medicine has never failed in such moral revival. It was thus in the 13th and 16th centuries, and will thus be in this or the century ahead of us.

Discussion.—DR. OSKAR DIETHEIM: It is with some hesitancy that I shall try to add a few points to the very inconclusive, provocative, and highly constructive presentation by Dr. Zilboorg. The historian Zilboorg

shows a certain pessimism which seems to me not justified when we consider the sound progress that has been made in the last 50 years. Zilboorg as a clinician gives encouragement and optimism in his discussion in which he presents the essence of psychotherapy. Remarkable progress has been made in psychological understanding and in the emphasis on the individual personality. We recognize now the need to study psychological development, the relationship to the environment, the interpersonal factors and cultural aspects.

DR. LOUIS LINN: Dr. Zilboorg raised the question whether it is possible to conduct psychotherapy in an individual whose ego function has been modified by organic means. In my opinion, the answer is yes. First we must ask, "What is psychotherapy?" I consider psychotherapy in its broadest sense, and include the beneficial influences which are derived from school, from work, from contact with loving friends and relatives, from recreation and other constructive influences in the community as well as the changes which the psychiatrist himself can effect via direct psychotherapeutic influences.

Dr. Zilboorg raised the question whether psychotherapy can ever be conducted in an individual in whom the full ego is not participating. I would say that all psychotherapy takes place in such a setting. This is the essence of mental illness: that the ego, such as it exists, is not a full ego, but a constricted, defensive structure, in which full potentialities are not being realized. What results from psychotherapy is a process of ego growth.

I have seen depressed patients go into remission after three or four shock treatments, and remain in remission for years thereafter, long after all organic effects of the shock therapy have worn off. What impresses me is that these patients emerge from their illness with the same defenses they would have employed had the psychosis been permitted to run its course without shock therapy. The task for the psychotherapist is essentially the same whether or not shock therapy has been used to shorten the psychosis. For these reasons I do not believe that the proper use of organic methods in psychiatric treatment constitutes a regressive development.

DR. PHILIP R. LEHRMAN: I wish to express my appreciation of hearing the brilliant paper of Dr. Zilboorg. There is only one thought I wish to express in reference to the various pharmaco- and surgical treatments of psychological disorders. These therapies divert the patient's as well as the physician's "return of the repressed", and in this way aid in strengthening the repressions. This is not a new idea and I'm sure Dr. Zilboorg is fully aware of it.

DR. ALVIN RALPH MILLER: I want to ask if Dr. Zilboorg would recommend Freudian psychoanalysis for anyone with overwhelming emotional conflicts; does he feel psychoanalysis is the only answer?

DR. GREGORY ZILBOORG: Dr. Diethelm is temperamentally optimistic, and I pessimistic, but there are no essential differences in our points of view.

Dr. Linn has raised a question which it would be a shame to leave unanswered our undiscussed. I did not say "the participation of the full ego." No ego is ever complete, particularly in disease. I said "with full participation of the ego forces available," and I think when you use a drug as an adjuvant you reduce the availability of those forces.

One word is left, and this is objection. I regret that people use the term "interpersonal relations." I do not know of any relation of any person to anything which is anything but interpersonal. I do not believe there are "interpersonal" relationships which are distinguished from other relationships of the individual. I think all psychiatric thought should be centered on the human being as an individual which includes everything in him in relation to himself as well as in relation to the outside world.

BOOK NOTES AND REVIEWS

Books received are acknowledged and given a brief description in this section. Selections serving a variety of interests will be made from these for a more extensive review, as far as space will allow.

BOOK NOTES

Monrad-Krohn, G. H. THE CLINICAL EXAMINATION OF THE NERVOUS SYSTEM. [New York and London: Paul B. Hoeber, Inc., 1955. Pp. xx + 428, 165 figures.]

This tenth edition of a universally well known and established text pertaining to neurological examinations has more than doubled in size and scope over the past 30 years. During this long period of service it has appeared in at least four languages with many reprintings.

A number of the chapters contain new material and some new chapters have been added to include the recent developments in neurological examination methods and diagnosis. Some additional illustrations enhance the value of the book for students. The autonomic system with the pharmacological tests usually employed in its examination has been given a fairly thorough treatment.

It was never intended to serve as a complete textbook of clinical neurology, but much of the contents will always help in reaching a differential diagnosis. An excellent example of book making, with clear illustrations and concise easily read text, it will undoubtedly remain one of our most useful tools in the examination room.

Brain, Sir Russell. DISEASES OF THE NERVOUS SYSTEM (5th Edition). [New York: Oxford University Press, 1955. Pp. 996 + xviii, 90 figures. Price $10.50.]

Since the appearance of the first edition of this book in 1933, it has become well known as a standard text. There have been three revisions since the war which is an indication of its popularity and success. The present edition contains new material on crevical spondylosis, the Coxsackie viruses, inclusion body encephalitis, acute hemorrhagic leuco-encephalitis, toxoplasmosis, polymyositis, neuropathy and myopathy associated with cancer and therapy of mengitis, poliomyelitis and lead poisoning.

As in previous editions the text is very readable, well organized, conveniently arranged and lucidly presented with references following each subject. It is adequately documented and with all a splendid comprehensive work for both medical student and practitioner.

Walshe, F. M. R. DISEASES OF THE NERVOUS SYSTEM (Eighth Edition). [Baltimore: The Williams and Wilkins Co., 1955. Pp. 357 + xvi, 58 figures. Price $7.00.]

The first edition of this successful textbook appeared only fifteen years ago, thus with numerous revisions and reprintings, in the meantime, it has kept up adequately with the progress of neurology. It obviously has a wide readership and has been popular with students. The size is a very convenient one for a book that has to be consulted frequently and the printing is excellent. The photographic illustrations are much clearer than in most neurological texts. While it is a relatively small book for such an extensive subject as neurology, one seems to be able to find most of the information of clinical importance sought or needed. It is a well constructed, easily readable book on a complex subject for which we are indebted to the scholarship and talent of one of the world's outstanding neurologists.

O'Sullivan, E. N. M. TEXTBOOK OF OCCUPATIONAL THERAPY. [New York: Philosophical Library, Inc., 1955. Pp. 319. Price $10.00.

This book while oriented chiefly in the field of psychiatry, deals fairly adequately with occupational therapy as applied in general. The chapters on the historical development, the

administrative procedures and the staffing of an occupational therapy department in a hospital are all excellently composed and informative.

A considerable portion of the book is devoted to handicrafts, recreations and educational analyses and procedures. Handicraft activities have been presented in the detail needed for instruction purposes, therefore the book will serve the student in this field with both a theoretical and practical text. The interpersonal relationships between members of the staff and with their patients are duly emphasized. It is a valuable and stimulating contribution in the areas it attempts to cover.

BOOK REVIEWS

Wilson, J. T. et al. CURRENT TRENDS IN PSYCHOLOGY AND THE BEHAVIORAL SCIENCES. [Pittsburgh: The University of Pittsburgh Press, 1954. Pp. 142. Price $4.00.]

This is one of the books of a series under the title "Current Trends in Psychology Series." It is composed of six lectures under the auspices of the Department of Psychology in the College of the University of Pittsburgh delivered during March 11 and 12, 1954 in the Mellon Institute auditorium.

Following the introduction by Dr. Robert A. Patton, professor of psychology and chairman of the department, the first lecture is by Dr. John T. Wilson of the National Science Foundation who discusses among other pertinent matters the relationship between psychology and behavioral science and the areas for research.

C. S. Ford of Yale University presents the contributions of anthropology to psychology and defines the scope of anthropology in a most illuminating lecture in which he points out the additional areas to be investigated. B. F. Skinner, professor of psychology at Harvard contributes an excellent chapter entitled "The Science of Learning and the Art of Teaching," and Gustav Bergmann of the State University of Iowa presents a scholarly examination into the relations among the behavior sciences under the title "Reduction."

Dr. Frank Beach, Sterling Professor of Psychology at Yale discusses the individual development "from conception to conceptualization" with all of the historical research background, the embryology of the vertebrate eye, and numerous experiments on various aspects of behavior bearing on his special topic. His closing sentence, "There is no fundamental discontinuity between pre and postnatal existence, nor between the physical and psychologic aspects of the individual," expresses the most fruitful concept for research in modern times.

The final lecture is by Dr. Karl H. Pribram of the neurophysiological laboratory of the Institute of Living at Hartford, Connecticut, outlining the possibilities of a science of neuropsychology and illustrated by experimental data.

This little book must be read by all workers interested in the topics considered in these lectures. It would be difficult to present a comprehensive review of the text since every page is packed with research accomplishments, leads, suggestions and comments. It is an excellent example of succinct presentations of complicated subjects.

NOLAN D. C. LEWIS

Jones, Ernest. SIGMUND FREUD: FOUR CENTENARY ADDRESSES. [New York: Basic Books, 1956. Pp. 150. Price $3.75.]

This little volume offers four lectures delivered in 1956 and a reprint of the eulogy which Jones published in the International Journal of Psychoanalysis in 1940. Since the entire collection is a memorial in honor of Freud, it contains nothing but unstinted praise. Even Freud's naive credulity and his mistaken evaluation of some of his associates' attitude toward him is presented in laudatory terms as a sign of genius. The credulity contrasted sharply with Freud's usual skepticism and imperviousness to opinion. Jones is a sincere admirer of Freud. He describes Freud's greatest achievement as follows: "He devised a method of exploring a previously inaccessible region of the mind we now call the unconscious, the existence of which had often been suspected, and he used this method, called psychoanalysis, to carry out a most detailed investigation of

the contents of the unconscious, including its highly peculiar mode of functioning." The procedure of free association and the techniques of translating the language of the unconscious into that of the conscious (displacement, condensation, repression, etc.) were Freud's most original contributions. Jones explains: "What he (Freud) actually discovered was not in itself so very new. It has been possible to trace most of Freud's ideas to earlier sources; whether he actually obtained them in that way or only from personal investigations is another matter. That holds good for the division of the mind, with a moral conflict between its two halves; the importance of sexuality in human life and even its specific connection with the psychoneuroses; the significance of repression, and so on. In fact, so far as I know, there was only one idea he discovered which had never been previously recorded. It was a very important one: the universal fear of castration among men." Freud had no predecessor when he introduced free association as a method which rendered the unconscious accessible to study. He also worked toward the creation of a new psychiatric movement and these organizational efforts were quite successful. Jones faces squarely what may be called the analyst's dilemma: "A valuable correction or extension of Freud's ideas may be derided as personal resistance by those analysts who for some reason have difficulty in accepting it. In all these matters we steer between Scylla and Charybdis, and the only sure compass is honesty and integrity." This compass is difficult to work. Jones himself takes a definite stand against all who disagreed with Freud.

It is Jones' view that anyone would profit greatly—even after the reading of an excellent book on psychoanalysis—from a study of the stages through which Freud's thought had passed. It may be noted that Jones does not believe such a book exists although there are praiseworthy beginnings. This volume does not offer any new facts but rearranges the old ones in a modified and very readable way.

ZYGMUNT A. PIOTROWSKI

BOOKS RECEIVED FOR REVIEW

DECEMBER, JANUARY AND FEBRUARY

ABRAHAM, KARL. *Clinical Papers and Essays on Psychoanalysis.* Basic Books, Inc., New York, N. Y.

AMERICAN PSYCHIATRIC ASSOCIATION. *Psychiatric Research Report 1.* Conference held at University of Texas, Medical Branch, Galveston, Texas, July 1955. American Psychiatric Association, Washington, D. C.

AMERICAN PSYCHIATRIC ASSOCIATION. *Psychiatric Research Report 2.* Conference held at the National University of Mexico, March 11–13, 1954. American Psychiatric Association, Washington, D. C.

BUES, ELMAR E. *Formen Des Posttraumatischen Kopfschmerzes.* Georg Thieme Verlag, Stuttgart, Germany.

CAJAL, SANTIAGO RAMON Y. *Studies on the Cerebral Cortex.* Year Book Publishers, Inc., Chicago, Ill.

COLBY, KENNETH MARK. *Energy and Structure in Psychoanalysis.* The Ronald Press Co., New York, N. Y.

GREENBLATT, MILTON, YORK, RICHARD H., AND BROWN, ESTHER LUCILE. *From Custodial to Therapeutic Patient Care in Mental Hospitals.* Russell Sage Foundation, New York, N. Y.

GREWEL, F. *Psychopathological Analysis of a Case of Pick's Disease.* F. Van Rossen, Publishers, Amsterdam, Holland.

GUIRAUD, PAUL. *Psychiatrie Clinique.* Librairie Le Francois, Paris, France.

JOSIAH MACY, JR. FOUNDATION. *Cybernetics.* Transactions of the Tenth Conference, April 22, 23, and 24, 1953. Josiah Macy, Jr. Foundation, Packanack Lake, New Jersey.

KALMAR, J. M. *Traitement Homoeopathique des Troubles du Psychisme et du Caractère.* Gaston Doin & Cie, Editeurs, Paris, France.

KOLLE, KURT. *Grosse Nervenarzte.* Georg Thieme Verlag, Stuttgart, Germany.

NOBILI, C. CATALANO, AND CERQUETELLI, GIANNETTO. *Gli Sviluppi Psicopatici.* Dott. G. Abruzzini, Editore, Rome, Italy.

SODDY, KENNETH (Ed.) *Mental Health and Infant Development.* Volumes One and Two. Basic Books, Inc., New York, N. Y.

SORIANO, VICTOR. *Epilepsias: Fisiopatologia, Clinica y Tratamiento.* Editorial Labor, (Sociedad Anonima Argentina), Montevideo, Uruguay, South America.

VAN PELT, S. J. *Hypnotic Suggestion, Its Role in Psychoneurotic and Psychosomatic Disorders.* Philosophical Library, Inc., New York, N. Y.

WHITE, ROBERT W. *The Abnormal Personality.* Second Edition. The Ronald Press Co., New York, N. Y.

WYRSCH, JAKOB. *Zur Geschichte Und Deutung Der Endogenen Psychosen.* Georg Thieme Verlag, Stuttgart, Germany.

NOTES AND NEWS

DECREASE IN MENTAL HOSPITAL PATIENTS

Reporting to Governor Averell Harriman on the status of mental hospital populations at the close of the fiscal year, Dr. Paul H. Hoch, Commissioner, said that for the first time since World War II the records of the New York State Department of Mental Hygiene show a decrease in the number of mental hospital patients.

While there has been no essential change in the number of admissions, there has been a sufficient increase in the number of releases during the past fiscal year not only to offset the admissions but to effect a slight decrease in the net population. For the past ten years the resident population of the mental hospitals has been increasing by an average of 2,000 patients each year. On March 31, 1956, however, the resident population (92,916 patients) was actually 500 less than it was on March 31, 1955. The difference lies in the fact that during this period there was an increase of 2,600, or 23 per cent, over the previous year in the number of patients released from the hospitals.

The improvement in release rates was attributed by the Commissioner to intensified treatment including more extensive use of the new tranquilizing drugs. There may be other factors, he said, which are not measurable at this time.

"While these statistics are most encouraging," Dr. Hoch warned, "it is too soon to know whether they represent an actual alteration in the rising trend or merely a temporary fluctuation. Certainly the decrease is insufficient to have any validity at this time as an indication of complete reversal. There is more reason to hope that we may be able just to hold the line—that is, to balance releases against admissions so that as time goes on we will no longer be faced with the appalling necessity of building the equivalent of a new institution every year to accommodate the additional patients. Instead we would be able to use our resources for more treatment, training and research. "It is still imperative, that we continue our present building program. The institutions are still 30 per cent overcrowded and many obsolescent buildings must be replaced. Furthermore we must have proper facilities if we are to provide good modern treatment."

NOTICE

The Public Health Service has announced a new procedure to expedite the processing of research grant applications for those requests which do not exceed $2,000 plus indirect costs and which do not ask support for more than one year. Such applications will be accepted and processed on receipt and are not therefore subject to the usual deadlines for submission prior to review.

Council recommendations can be expected on these applications within 1–4 months from the time of submission. These procedures do not apply for requests for supplements to existing grants.

Address all applications as well as requests for forms or additional information to the Division of Research Grants, National Institutes of Health, Bethesda 14, Maryland.

PSYCHIATRIC NURSES NEEDED

Steadily expanding activities in the field of mental health and the greater number of aged persons in the population have created an increased need for nurses with psychiatric training, according to Miss Adele Poston, Director of the Psychiatric Nurses Bureau, 145 East 35th Street, N. Y., which is celebrating its 30th Anniversary this month. During these past three decades the Bureau has provided nursing personnel for more than 25,000 patients.

"Hospitals, institutions and welfare organizations are having difficulty in obtaining nurses who have had experience in caring for the mentally ill," Miss Poston said. "Fortunately, the New York City municipal hospitals are helping to overcome this shortage by including psychiatric training in the curricula of their schools of nursing, and our Bureau is doing all that it can to encourage more men and women

to train for careers in the field of psychiatric nursing.

"The demands on nurses who care for mentally ill or emotionally disturbed patients call for good judgment and kindliness as well as knowledge and skill. The function of the psychiatric nurse is closely related to that of the physician, and she often has unusual opportunities to help bring about sound emotional health."

McGILL UNIVERSITY, ROYAL VICTORIA HOSPITAL, DEPARTMENT OF PSYCHIATRY, WELL BEING CLINIC

The first Well Being Clinic was set up in December 1954 by the Department of Psychiatry of McGill University working through the Allan Memorial Institute (Royal Victoria Hospital) in collaboration with the Montreal Mental Hygiene Institute, the Central Division of the Young Women's Christian Association and the University Extension Department.

The Clinic has revealed a desire on the part of many members of the public to obtain a routine check up of their mental health similar to physical check ups. The primary purpose of the clinic is to serve healthy people and to develop within them a better understanding and a more positive attitude towards their mental health. The major area of usefulness is that of problem identification. It also serves as a means of appraisal—to see how problems are being handled. In addition the Well Being Clinic is well equipped to act as a screening centre for cases of early mental ill health.

The present clinics are self supporting financially. The work is carried out by professional psychiatric social workers acting under the direction of a psychiatrist.

MENTAL HEALTH PROGRAM FOR CHILDREN

Need for a coordinated mental health program for school children has led the Welfare and Health Council of New York City to launch a complementary mental health study as part of its three-year School Health Survey. The new phase of the research appraisal of health programs in New York City schools was announced by Ray E. Trussell, M.D., M.P.H., newly appointed chairman of the Survey Advisory Committee, who is associate dean (public health) and executive officer of the School of Public Health and Administrative Medicine at Columbia University. Dr. Trussell succeeds Dr. George M. Wheatley III, vice-president of the Metropolitan Life Insurance Company, who was chairman of the Council's Health Division when the initial survey on school health was made and who established the present project. Dr. Wheatley was chief pediatrician on the "Astoria" survey of school health services in New York City conducted during 1938–1940, which formed the basis for the current city school health program.

Dr. Trussell explained that the School Health Survey, being conducted with co-sponsorship of the New York City Board of Education and the Department of Health, with support in part by a $160,000 grant from the United States Public Health Service, will seek to determine the effectiveness of the city school health service in placing children with health problems under care, and in improving methods of referral to facilitate proper and timely treatment.

"Although primary emphasis in this survey is on follow-through of recommendations on all health problems," Dr. Trussell explained, "the mental health study also will focus on screening and detection through teacher observation and other techniques. It is well established that this essential public health activity is at a relatively elementary level today, and that there is great need for a coordinated mental health program for school age children. We hope that this proposed study will break new ground in providing a total health appraisal and service, and will establish practical means for operation within a school-based system."

Formulation and design of the new mental health program will be undertaken by Dr. Stella Chess, associate clinical professor in psychiatry at Flower-Fifth Avenue Hospital and coordinating psychiatrist at the Northside Center for Child Development. She will be assisted by Dr. Harold Michal-Smith, chief of psychological services at Flower-Fifth Avenue Hospital. Dr. Lauretta Bender, research director of the New York State Department of Mental Hygiene, will serve as principal consultant. Dr. William C. Spring, Jr., is project director. Irving Ladimer is project administra-

tor, and Mrs. Annemarie Crocetti is chief of field surveys.

In this basic School Health Survey itself, the program calls for a core study of elementary and junior high-school students whose health and academic records will be reviewed. Selected groups of this sample will be given health examinations and checked through interviews with members of the family, teachers, principals, nurses and others who are concerned with child health. The program is being undertaken in public and parochial schools in the city, including populations of high, medium and low socio-economic standing, with due consideration for ethnic, educational and other characteristics.

IDIOPATHIC GLOSSODYNIA (BURNING TONGUE)

The undersigned are investigating the psychosomatic and psychodynamic aspects of the problem of idiopathic oro-lingual paresthesias and particularly idiopathic glossodynia (burning tongue) in which cases the histories and repeated oral examinations are always negative, as are the laboratory findings. These factors lead us to believe that this frequently seen syndrome (five new patients per week, perhaps, in our clinic) has a psychosomatic origin and requires psychotherapeutic measures for elimination.

However, owing to the sometimes transitory character and lack of severity of the disease, psychiatric clinics are unwilling to treat these cases on an experimental basis without charge. In addition, the reluctance of such patients to pay for such therapy privately or to entertain the thought of commencing psychotherapy has prevented a study of the effectiveness of psychotherapy in eliminating the symptoms of this disturbance.

This letter is written with the hope that psychotherapists reading this appeal will cooperate with us to the extent of supplying us with information relative to findings in patients now under treatment in their practice who have "burning tongue" symptoms. We realize, of course, that in nearly all instances the burning tongue would be only one of a group of complaints for which the patient is being treated. However, *we* are focusing our attention on this aspect of the syndrome.

We would therefore be most appreciative if any physician having such a patient now or previously under treatment would advise us of this fact together with whatever brief information he may feel is pertinent as to history, physical examination, course of illness, therapy, and results.

We are interested particularly in the psychodynamic aspects of this somatization reaction; whether the therapist felt it was primarily one more manifestation in an oral personality; or whether the symptoms appeared as a regressive defense against other instinctual conflicts. We are aware that this is just one of the components in a psychopathologic constellation, but its frequency warrants investigation.

With the above information we hope to be able to better describe the syndrome of idiopathic glossodynia and ascertain the efficacy of psychotherapy for patients presenting this problem—one of great consequence to those practitioners whose chief area of concern is the oral cavity. This importance can be demonstrated both in terms of numbers of patients and the severity of the complaints as expressed by them.

Through the courtesy of the Editor, we have been permitted this means and opportunity to appeal to the readers of the Journal to make available any such case histories as you may be willing to place at our disposal. Of course, all such information as to the source from which it emanated will be suitably acknowledged in the publication which we hope will result from this study.

Kindly address your reply to Dr. Austin H. Kutscher, School of Dental and Oral Surgery, Columbia University, 630 West 168th Street, New York 32, New York.

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